FEBRUARY 2000
Volume 68 No 2

Amateur Radio

'Spicy' circuits

Circuit simulation using Spice or Pspice

- An experimental Low Frequency Band Transmitter
- 40w Mosfet HF Linear Amplifier
- An On-Air Czech
- MORE 'SPICE' — The Spouses' Day Out

Inset: HOME BREW YAGI ANTENNA ARRAY

(more cover details page 1)

COVER: PHOTO: 'ART IN AMATEUR RADIO'

Quo Vadis Morse II?

plus

ALARA

WIA, Divisional & Club News & regular columns

WIA Yearbook 2000

Callbook Listings
Frequency Listings
Band Plans
Repeater Lists
Beacon Lists
Satellite Lists
Licence Conditions
Examiner Lists
Special Interest Groups
Public Relations Notes
Radio and TV Freqs.
and much, much more !

2000 is a great year to have an up-to-date call book.
This YEARBOOK edition contains all of the content you have come to expect of the WIA callbook as well as some new items.

It is more than a callbook, it's a Yearbook, the WIA Yearbook!

The "WIA Yearbook 2000" is now available from Divisional Bookshops and selected outlets.

Amateur Radio

The Journal of the Wireless Institute of Australia

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Volume 68
Number 2
February 2000

General

Technical

Columns

Our cover this month

Main Photo: 'ART IN AMATEUR RADIO'

Michael Corbin's VK2YC Home QTH Array, picturesque against the setting sun

Inset: VHF Yagi Antenna Array of Bill Hockley VK6AS, of Esperance, WA

Comprises 8X 16 element home brew Yagis for a total of 128 elements. Boom length is 9.2m (4.4λ). E stack 14'1". H stack 13'4 1/4" Gain is 22DBD. Used for Troppo and EME. Has both Azimuth and Elevation Capability

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Contributions to Amateur Radio
Amateur Radio is a forum for WIA members' amateur radio experiments, experiences opinions and news. Manuscripts with drawings and or photos are always welcome and will be considered for publication. Articles on disc or email are especially welcome. The WIA cannot be responsible for loss or damage to any material. A pamphlet, How to write for Amateur Radio is available from the Federal Office on receipt of a stamped self-addressed envelope.

Back Issues
Back issues are available directly from the WIA Federal Office (until stocks are exhausted, at $4.00 each (including postage within Australia) to members.

Photostat copies
When back issues are no longer available, photocopies of articles are available to members at $2.50 each (plus an additional $2 for each additional issue in which the article appears).

Disclaimer
The opinions expressed in this publication do not necessarily reflect the official view of the WIA and the WIA cannot be held responsible for incorrect information published.

Amateur Radio Service

A radiocommunication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs; that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

Wireless Institute of Australia

The world's first and oldest
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Founded 1910

Representing
The Australian Amateur Radio Service

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EDITORS COMMENT

Colwyn VK5UE

Post woes

JANUARY AR got out a little earlier than December but it seems that there is a week between delivery in Melbourne and the outer fringes of the country. My personal copy arrived 18th January. So even if we try to get the issue posted in Melbourne on the Wednesday before the first Friday of the Month of issue, some of us will not see it until the second Friday.

Morse: on the way out?

The ARRL decision to reduce Morse code testing to 5 wpm only will go a long way to making HF bands available to more amateurs and aspiring amateurs. It will also, I think, mean that a Morse code test to get any form of Amateur licence is on the way out. We now have to ensure that our examinations are relevant to licencing people with knowledge and skills required to operate an Amateur Radio Station effectively. People, who are able to set up the station, operate it for effective communication and are courteous to others and do not spoil the enjoyment of other users of our bands.

You, too, can be published

Now as you are all very aware the WIA requires lots of voluntary input to keep our hobby viable. This magazine also runs on a lot of voluntary help. In is our "In House Journal" that is why it contains WIA and Divisional Notes as well as technical and general articles. There are people who write about what they are doing both experimentally and generally, but they cannot write articles for every issue of AR. Everything that is a little novel or just helps us operate better is worth sharing with others through the magazine. Can someone have their arm twisted to write about "Digital Modes on the HF Bands" and "Amateur TV" for starters? If you think these topics are irrelevant then please write an article on something that is.

While I am looking for articles of all sorts I would particularly like some photographs of Amateur activities. Photos of people using equipment or at Conventions or like this month's cover, major home brew equipment are also needed for the cover. There is a limit to the local items of Amateur interest that I have access to for photography. The most important things about the photographs are sharp focus and good contrast. Pictures should have the subject in an uncluttered background. I have some photos at present, where it is very hard to distinguish whip aerials against vegetation, brickwork or utility poles and wires.

Congratulations!

There are two awards presented by the Amateur Radio Publications Committee each year, the ***Higginbotham Award*** for general service to Amateur Radio, not necessarily the magazine and the ***Technical Award*** for the best technical article in the previous year's magazine.

The 1999 awards have been made as follows

1. ***The Higginbotham Award to Eric Jamieson, VK5LP.***
   Eric has produced the 'VHF-UHF, An Expanding World' column in Amateur Radio Magazine for some 30 years. The award recognises his dedication, and skill in collecting the information and presenting it in a readable form for all amateurs.
2. ***Technical Award to Guy Fletcher, VK2KU***
   for his article "Boom Corrections to Element Lengths of Yagis at 144, 432 and 1296 MHz", published in the March 1999 issue on page 11

Action for the month: John Moyle Field Day

Think about it, and then do something about participating. It is surprising what a few whips on a roof rack or gutter or magnet mounted can do on the right bands at the right time of day.

WIA News

Compiled by
Federal News Coordinator

Y2K – (Hopefully) the Last Word

The world didn't end, nor were there any decent computer-induced catastrophes to report. The lights stayed on (unless you happened to be unlucky enough to live in Gambia); a few military satellites lost their carefully harvested spy data; several nuclear power plants suffered minor malfunctions, without compromising anyone's safety (they said), a few airport radar systems, dialysis machines, and plastic card eaters spat the dummy, but for the most part, life has carried on.

There were few communication problems to report (as of 9th January as I write this). From my vantage point overlooking Sydney harbour, the only technical problem I noticed was that my GSM cellphone reported "no signal" – hardly surprising given a million or so people nearby at least some of whom felt the need to tell someone how good the fireworks looked. In contrast, landlines appeared to be okay (at least there was a dialtone). Had the phone system been totally incapacitated, I'm not sure that Amateur Radio would have helped, unless the accursed pagers that plague two metres were to fall silent as well!

Many were disappointed, not least of which the journalist hoping for juicy stories to fill their papers. Others have complained that it was all a con, still others pleased that the money spent fixing defective software was spent well. (I fall into this last category, having seen the devastating effects of the bug when testing some fixes back in 1998.) Anyway, it seems to be all over bar the shouting, at least until 29th February...

Radio Amateurs were active in many parts of the world, having been requested to monitor the situation and to provide backup communications should the need arise. In Australia, the only official Amateur involvement reported so far was in VK3, where WICEN Victoria was on standby to provide emergency communications; for details of VK3 WICENs extensive preparations, see their web page at http://www.vic.wicen.org.au/

continued next page

Comment

Federal President, Peter Naish VK2BPN.

Morse proficiency: necessary or obsolete?

The hottest topic of the month is again The Morse Code. Or rather, the need to demonstrate a proficiency in sending and receiving Morse code before one is allowed to operate on the HF Bands.

As most of you know by now, the FCC in the USA has changed the rules to reduce the number of licence grades to just three, with a maximum speed requirement of 5 WPM for those licences which permit HF band operation. This closely followed a change in the UK where their licencing authority has introduced a HF licence with a 5 WPM examination. Clearly, the move has begun overseas to phase down the long-standing requirement for stringent Morse code proficiency.

With this movement it is inevitable, that here in Australia, we should be looking seriously at our situation regarding Morse code. The WIA is taking a leading position and there has already been dialogue with ACA to sound out the feeling of our regulators. As expected, they are well aware of the world movements. They have expressed a wish to work closely with WIA to review the Australian licence requirements and implement any changes, which may be appropriate. The WIA Federal Council through its ACA Liaison Committee is preparing, as a matter of urgency, its strategy in regard to 5-WPM code speed. This is expected to reflect the current strong opinion from Australian amateurs generally that a reduction in the speed of the Morse code examination should be made as soon as possible.

The complete abolition of the need to pass a Morse code examination before being granted HF Band privileges is still some way off. The ITU treaty, that establishes the Amateur Radio service, may not be varied for a number of years yet. It is however high on the list of subjects for discussion within the IARU, the body that represents amateur radio in the international arena. The IARU, together with member organisations such as WIA, will be working closely with ITU delegates to ensure that popular views in regard to Morse code are presented at forthcoming WRC meetings. This is one issue that concerns all Australian amateurs, whatever their interests and whether WIA members or not. It is good that we can work together for our mutual benefit.

A final comment - Morse code is alive and well, as anybody who takes the time to listen on the HF bands will find. It is the preferred mode of operation of many amateurs worldwide. Much of the most exotic DX is best available on CW. However, with the demise of Morse code in commercial and government telecommunications, there is now little logic in mandating a need to demonstrate Morse code proficiency as a prerequisite to HF Band amateur radio operation. The argument is not for or against Morse code, but for or against Morse code examinations. My personal opinion is that the abolition of Morse code examinations is only a matter of time.

During the next week or so I will be in a better position to bring you news of the WIA's activities in respect of this very important matter,

FCC restructures US Amateur Licences

Three license classes, one code speed (5 wpm)

The FCC has issued its long-awaited Report and Order on amateur licensing restructuring. The bottom line is that starting April 15, 2000, there will be three license classes—Technician, General, and Amateur Extra—and a single Morse code requirement—5 WPM.

"We believe that an individual's ability to demonstrate increased Morse code proficiency is not necessarily indicative of that individual's ability to contribute to the advancement of the radio art," the FCC said.

Besides drastically streamlining the Amateur Radio licensing process, the FCC said its actions would "eliminate unnecessary requirements that may discourage or limit individuals from becoming trained operators, technicians, and electronic experts."

Although no new Novice and Advanced licenses will be issued after the effective date of the Report and Order, the FCC does not plan to automatically upgrade any existing license privileges. The ARRL had proposed a one-time, across-the-board upgrading of current Novice and Tech Plus licensees to General class, but the FCC declined to adopt the idea. This means that current licensees will retain their current operating privileges, including access to various modes and subbands, and will be able to renew their licenses indefinitely.

Starting April 15, 2000, individuals who qualified for the Technician class license prior to March 21, 1987, will be able to upgrade to General class by providing documentary proof to a Volunteer Examiner Coordinator, paying an application fee, and completing FCC Form 605.

The FCC's decision not to automatically upgrade Novice and Tech Plus licensees means the current Novice/Tech Plus HF subbands will remain and not be "refarmed" to higher class licensees as the ARRL had proposed. The FCC said it did not refarm these subbands because there was "no consensus" within the amateur community as to what to do with them. The FCC decided to lump Technician and Tech Plus licensees into a single licensee database, all designated as "Technician" licensees. Those who can document having passed the 5 WPM Morse code examination will continue to have the current Tech Plus HF privileges. The FCC said it may request documentation from a licensee or VEC to verify whether a licensee has passed a telegraphy examination.

The FCC action also authorizes Advanced Class hams to prepare and administer General class examinations, and eliminates Radio Amateur Civil Emergency Service (RACES) station licenses. RACES will remain, however.

Under the new licensing scheme, there will be four examination elements. Element 1 will be the 5 WPM Morse code exam. Element 2 will be a 35-question Technician exam; Element 3 will be a 35-question General exam; and Element 4 will be a 50-question Amateur Extra exam. The FCC has left it in the hands of the National Conference of VECs Question Pool Committee to determine the specific mix and makeup of written examination questions.

Elimination of the 13 and 20 WPM Morse requirements means an end to physician certification waivers for applicants claiming an inability to pass the Morse code examination due to physical handicap.

The FCC disagreed with the League's suggestion that it undertake a restructuring of operating privileges along with licensing restructuring. The Commission said it wanted to give the amateur community a chance to "reach a consensus" regarding new technologies before it tried to restructure amateur operating privileges and frequencies.

A copy of the entire Report and Order (FCC 99-412) is available at http://www.arrl.org/announce/regulatory/wt98-143ro.pdf or at http://www.fcc.gov/Daily_Releases/Daily_Business/1999/db991230/fcc99412.txt

(from ARRL Bulletin 96, 30 December 1999) /EX

Catch an Intruder in 2000

Tom Walker VK4BTW the VK4 Coordinator, extends an open invitation to all Amateurs who value our Spectrum Space to file reports on non-Amateur activities heard on ANY of our Bands.

To that end there is an Intruder Watch Net held weekly on Fridays at 0700 UTC, on 3.578 MHz +/- QRM. Here is an ideal place to exchange information and ideas regarding experiences in logging and dealing with intruders. Feel free to join in; you will be most welcome, it's a good place to start if you wish to help in this Service.

Contact by Packet :- VK4BTW @ VK4WIP.#IPS.QLD.AUS.OC or by Post:

Reply Paid No. 73
T.A. Walker
13 Bothwell St.
TOOWOOMBA Qld. 4350

TAPR Releases Draft APRS Protocol Specification

The APRS (Automatic Position Reporting System) Working Group has completed the second public draft of the APRS Protocol Specification.

This document covers the core functionality of APRS Protocol Version 1.0 as it works today. This is the base-level specification that all implementations should comply with. It was adopted unanimously by Working Group members, who include the authors of APRS-DOS, WinAPRS, MacAPRS, X-APRS, PocketAPRS, APRS+SA, javAPRS, and APRServe, and the developers of the Mic-E and Pic-E products.

The Specification now includes packet format diagrams, the APRS symbol tables, full details of the Mic-E encoded format, the compressed latitude/longitude position format, plus weather report and telemetry formats. Above all, the Specification contains many examples of how APRS data is formatted to make it easier to understand.

The APRS Protocol Specification draft now is available as an Adobe PDF file at http://www.tapr.org/tapr/html/Faprswg.html. Comments, criticisms and suggestions for improvement are invited, and the document includes details on how to file comments.

The APRS Working Group will issue the final approved version of the Specification as soon as possible after it considers all comments

(John Ackermann, N8UR, in the ARRL Letter 18.48, dated 10 December 1999)

United Kingdom: Amateur Radio and the Internet

Ian Abel G3ZHI reports that since the UK's regularity body, RA's earlier announcement that radio amateurs will be able to connect to the Internet, these facilities have now been agreed following consultation with the Radio Society of Great Britain (RSGB). The initial phase of experimentation will allow

1. Linking of repeaters to non-amateur networks
2. Linking of Mailboxes, existing SysOps will be able to apply for an extension to their Mailbox Notice of Variation to allow connection to non-amateur networks.
3. Remote Control of Repeaters

The RA locally in Nottingham has allowed on a temporary and experimental basis a local simplex link between Internet Iphone chat group and 437.5MHz output.

So if you hear or see Aidey G7WFM's callsign in Iphone or on your Repeater call him!

This is one of the first such experiments following the RA's announcement recently to allow Internet access between radio amateurs worldwide via Internet.

g3zhi/g4njh via QNEWS

ar

CLUB NEWS

News from the Moorabbin & District Radio Club

Peter Parker VK3YE, Publicity Officer
parkerp@alphalink.com.au (03) 9569 6751

MDRC interviewed on 3RPH

More people now know about the MDRC and amateur radio thanks to an interview on community radio station 3RPH. The interview was first broadcast on Sunday December 19 and was repeated on Monday December 20.

The 13-minute interview was part of 3RPH's 'Feedback' show - a program on developments in radio communications and broadcasting. It covered past and present activities of the MDRC. The interview was conducted by Laurie Walters VK3DPD, the program's producer.

3RPH is a community radio station run by the Vision Australia Foundation - a non-profit support group for blind people. The station is run almost entirely by some 400 volunteers. Volunteers do research, collate material to be read out, do on-air readings and carry out interviews. If you'd like to offer yourself for a few hours a week, phone the station on 9864 9333.

Radio on Rails Results

Results for October's Radio on Rails have been released and appear below:

Section A - Transmitting Mobile

1. VK3JED 91
2. VK3YE 85
3. VK3KBD 19

Section B - Receiving Mobile

1. Craig White 22

Section C - Transmitting Home

1. VK3TYR 30
2. VK3CAT 28
3. VK3GK 12
4. VK3JWT 10

Section D - Receiving Home

1. Craig White 7

Winning stations and placegetters should have received certificates by the time they read this. Thanks to those who participated and made Radio on Rails a success. The rules seemed to work well, and no changes are proposed. The next event is planned for early April - more details next month.

MDRC's stall at November's St Kilda Hobby Show. In the picture are Craig (SWL) and Keith VK3JNB.

October 1999 Radio on Rails participants. L to R - Tony VK3JED, Peter VK3YE, Darryl VK3HEM, Craig (SWL), Paul VK3ALE, Terry VK3KBD.

Hobby Show

A date has been set for the next St Kilda Hobby Show. The show will be held on Saturday February 26 between 11am and 7pm. The venue will be the same as last time - the Army hall, 8 Chapel Street, St Kilda.

The MDRC ran an amateur radio station at the first Hobby Show, held last November. The photograph shows our exhibit at the show. We plan to be there again this month, and hope that other amateur clubs will also be present. Information on the show appears at

URL: http://www.skyboom.com/original/hbbyshow.html

News from AHARS

THE ADELAIDE HILLS AMATEUR RADIO SOCIETY MEMBERS have been invited to join the South Coast Radio Club for a barbecue on Jan19th. That should be an interesting evening as it also includes a talk about the visit to the Dayton Hamfest made by four intrepid VK5 amateurs in 1999.

We are fortunate to have Rob VK5RG as our Program organiser again this coming year so we can look forward to a year of interesting, mostly technical lectures if previous years are any indication. Rob has many contacts with people doing interesting things.

In February, to follow the AGM we have Graham VK5ZFZ talking about loudspeakers, which should open a few eyes. We all use loudspeakers but few of us know the ins and outs of their versatility and how to repair them when they misbehave.

Circuit Simulation using Spice or PSpice

by Phil Rice VK3BHR
Lot 601K Durston's Rd.
Maiden Gully Vic. 3551

When designing a new RF circuit, it is often useful to build a prototype. This can become a bit tedious when iteratively refining a design. An alternative is to simulate the circuit on a computer so you know what you are practically aiming at.

There are a number of circuit simulation programs available, the latest of which offer integrated schematic capture and component databases.

PSPICE was one of these (the company that produced it, Microsim, has been bought out and PSpice is no longer produced). Evaluation versions of PSpice suitable for nearly any PC or compatible (or Macintosh too) can be found on the Internet.

To make this information as widely useful as possible (we don't all have the latest Pentium boxes) I will avoid the latest graphic window dressing (circuit capture from schematics) and concentrate on text input of the circuit. I feel this isn't a backward step as PSpice circuit descriptions are easy to put together. Each component is described by a name, connection points (nodes) and value or a model description.

PSpice is capable of a number of types of simulation (nonlinear dc, nonlinear transient, and linear AC analyses) on circuits containing resistors, capacitors, inductors, mutual inductors, independent voltage and current sources, four types of dependent sources, transmission lines, and the four most common semiconductor devices: diodes, BJT's, JFET's, and MOSFET's.

Linear AC analyses will be the most useful, so that's the one we will look at in a bit of detail. PSpice will do a nonlinear DC analysis when analysing a semiconductor circuit (to find the quiescent conditions), so you get that for free.

To begin, you need a circuit diagram (Figure 1). Number the points of interconnection (the nodes) . Ground must be node zero and you can't have more than 64 nodes in the evaluation version of PSpice.

Next, name all the components (Figure 1 again) but see Table 1 for the rules. For each component you need

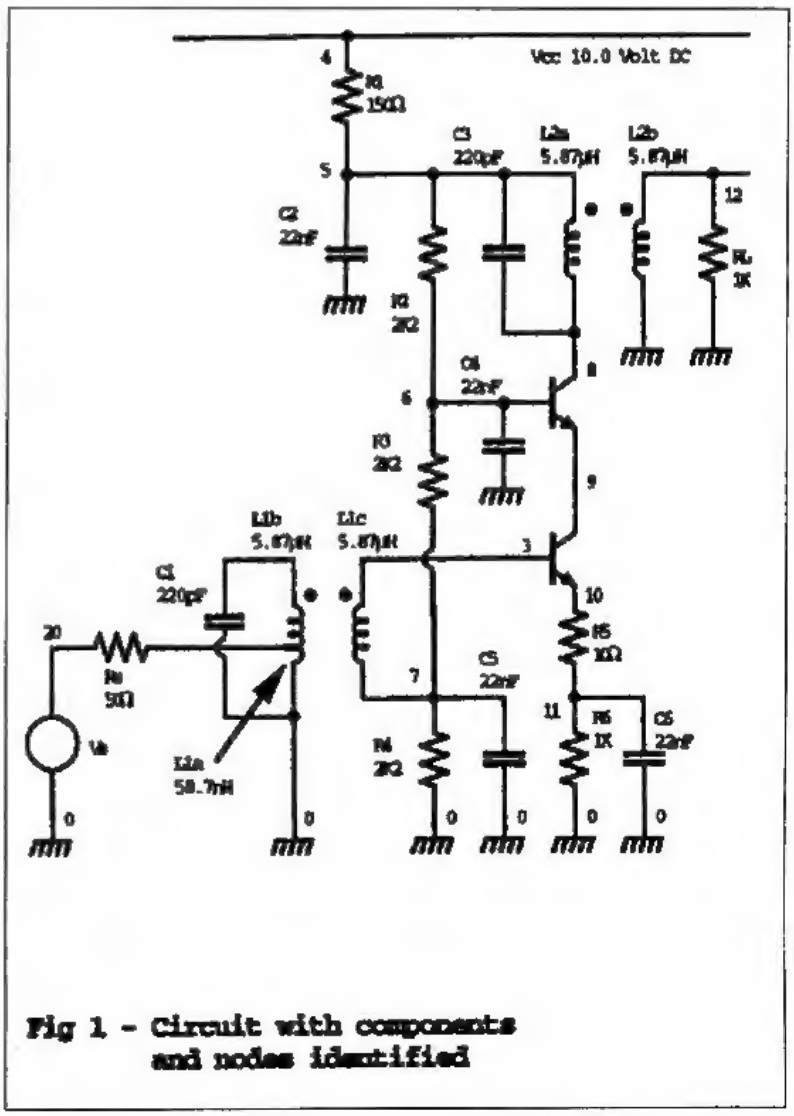

Fig 1 - Circuit with components and nodes identified

```
Intermediate frequency cascode amplifier

Vcc    4    0    DC 10.0V

* Simulate signal source

Vs     20   0    AC  1.0V
Rs     20   1        50.0

* Bias resistors

R1      4   5       150.0
R2      5   6      2200.0
R3      6   7      2200.0
R4      7   0      2200.0
R5     10  11        10.0
R6     11   0      1000.0


* Input tuned circuit
* Turns ratio
* L1a:L1b:L1c = 1:10:10
* "Tight coupling"

C1     2    0       220.0pF

L1a    1    0         0.0587uH
L1b    2    0         5.87uH
L1c    3    7         5.87uH
K1ab L1a L1b          0.9
K1bc L1b L1c          0.9

* Bypass capacitors

C2     5    0        22.0nF
C4     6    0        22.0nF
C5     7    0        22.0nF
C6    11    0        22.0nF

* Cascode transistors

Q1     9    3    10     PN2222A
Q2     8    6     9     PN2222A

* Output tuned circuit
* Turns ratio
* L2a:L2b = 1:1
* "Tight coupling"

C3     5    8       220.0pF

L2a    5    8         5.87uH
L2b   12    0        5.87uH
K2ab L2a L2b          0.75

* "Load" simulates effect of
* next stage

RL    12    0      1000.0

.ac lin 51 4.00MegHz 4.50MegHz

.print ac vdb(12)
.probe

.model PN2222A  NPN(  Is=14.34f
+ Xti=3 Eg=1.11 Vaf=74.0 Bf=256
+ Ne=1.307   Ise=14.34f Ikf=.2847
+ Xtb=1.5    Br=6.0     Nc=2 Isc=0
+ Ikr=0      Cjc=7.3p   Mjc=.3416
+ Vjc=.75    Fc=.5      Cje=22.0p
+ Mje=.377   Vje=.75    Tr=46.9n
+ Tf=410p    Itf=.6     Vtf=1.7
+ Xtf=3      Rc=1       Rb=10)

.end
```

Fig 2 - SPICE input file

one statement consisting of the name, node numbers and value (or for semiconductors, a model name). Figure 2 is the PSpice input file for the circuit of Figure 1. Component values include the most common abbreviations for multipliers. Any extra parts of the value are treated as comments - ie. ignored, so you can for example use µF, pF etc. and it will work OK. PSpice will use the very first statement as a title on it's output listing, so if you forget the title statement, PSpice will steal the first component from your circuit and then complain about its absence.

For each type of semiconductor, you will need a "dot Model" statement. Unless you are trying to do accurate modelling, the default statements given in table 1 will be OK. Sometimes more accurate models can be got from semiconductor manufacturer's Internet Web pages. The PN2222 model of Figure 2 will do for most "general purpose small signal" NPN silicon transistors.

Finally, you need some control statements to set the frequency range for the linear AC analyses and to specify the required output.

Figure 3 is an example of part of the text output available from PSpice (edited severely to fit). There's a lot more information in the listing.

Figure 4 is a graph produced by the "Probe" program that accompanies PSpice. To generate data for this program to graph, just include the statement "dot probe" in your PSpice input file (see Figure 2). Probe is a menu driven program and fairly easy to use. When it asks you to "Enter variables or expressions ..." you can enter variable names as for the "dot plot" or "dot print"

continued next page

Checklist

1. Draw circuit
2. Name components
3. Number nodes
4. Component statements
5. Device models
6. Control statements

Component values:

Numbers may be integer, floating point, or scientific with or without a scale factor of:

T=1E12 G=1E9 MEG=1E6 K=1E3
M=1E-3 U=1E-6 N=1E-9 P=1E-12
F=1E-15 MIL=25.4E-6

Letters which are not scale factors are generally ignored.

Basic components

Rxxxxxxx N1 N2 VALUE
Cxxxxxxx N+ N- VALUE
Lxxxxxxx N+ N- VALUE

Coupled inductors

Kxxxxxxx Lyyyyyyy Lzzzzzzz VALUE

VALUE is the coefficient of coupling between Lyyyyyyy and Lzzzzzzz. 0 < VALUE <= 1.0

Using the 'dot' convention, place a 'dot' on the first node of each inductor.

Remember *L=N*N*
If you have a turns ratio of 4:1 the inductor values will have a 16:1 ratio.

Independent Sources

VXXXXXXX N+ N- DC value AC value
IYYYYYYY N+ N- DC value AC value

N+ and N- are the positive and negative nodes, respectively. Sources need not be grounded.

Positive current is assumed to flow from positive node, through the source, to the negative node. A current source of positive value, will force current to flow from the N+ node, through the source into the N- node.

Voltage sources, in addition to being used for circuit excitation, are the 'ammeters' for SPICE, that is, zero valued voltage sources may be inserted into the circuit for the purpose of measuring current. They will have no effect on circuit operation since they represent short-circuits.

Diodes

DXXXXXXX N+ N- MNAME
.MODEL MNAME D IS=1.0E-13 RS=1 CJO=3.3pf

NAME	PARAMETER	DEFAULT	TYPICAL
RS	Ohmic resistance	0	10
CJO	Zero bias junction capacitance	0	2pf
IS	Saturation current	1.0E-14	1.0E-14

The parameters are optional.
The .MODEL statement can be as short as:

.MODEL MNAME D

Which is a rough approximation to a "small signal" diode.

Transistors

QXXXXXXX NC NB NE MNAME
.MODEL MODL NPN BF=80 BR=0.02 IS=1.0E-16 CJC=0.1pf

NAME	PARAMETER	DEFAULT	TYPICAL
BF	Forward beta	100	200
BR	Reverse beta	1	0.1
RB	Base ohmic resistance	0	100
RC	Collector ohmic resistance	0	10
RE	Emitter ohmic resistance	0	1
CJE	Zero bias B-E junction capacitance	0	2pf
CJC	Zero bias B-C junction capacitance	0	1pf
IS	Saturation current	1.0E-14	1.0E-14

A silicon device is assumed unless otherwise specified.

The parameters are optional.
The .MODEL statement can be as short as:

.MODEL MNAME NPN or PNP

Which is a rough approximation to a "small signal" transistor

.AC Statement

.AC DEC ND FSTART FSTOP
.AC OCT NO FSTART FSTOP
.AC LIN NP FSTART FSTOP

FSTART is the starting frequency.
FSTOP is the final frequency.

DEC stands for decade variation, and ND is the number of points per decade.
OCT stands for octave variation, and NO is the number of points per octave.
LIN stands for linear variation, and NP is the number of points.

If this statement is included in the file, SPICE will perform an ac analysis of the circuit over the specified frequency range.
In order for this analysis to be meaningful, at least one independent source must have been specified with an ac value.

.PRINT or .PLOT Statement

.PRINT or .PLOT AC or DC Variable_List

eg. .PRINT AC VM(4,2) VR(7) VP(8,3)
.PLOT DC V(2) I(VSRC) V(23,17)

This statement produces a tabular listing or graph of one to eight output variables.

V(N1,N2) specifies the voltage difference between nodes N1 and N2.
If N2 is omitted, ground (0) is assumed.
For the ac analysis, five additional Outputs can be accessed by replacing the letter V by:

VR - real part, VI - imaginary part, VM - magnitude, VP - phase, VDB - 20*log10(magnitude)

I(VXXXXXXX) specifies the current flowing in the independent voltage source named VXXXXXXX. Positive current flows from the positive node, through the source, to the negative node. For the ac analysis, the corresponding replacements for the letter I may be made in the same way as described for voltage Outputs.

Table 1

```
**** 02/17/99 12:08:19 ********** Evaluation PSpice (July 1993) *************

 Intermediate frequency cascode amplifier

 ****     SMALL SIGNAL BIAS SOLUTION       TEMPERATURE =   27.000 DEG C

********************************************************************************

 NODE   VOLTAGE     NODE   VOLTAGE     NODE   VOLTAGE     NODE   VOLTAGE

(    1)    0.0000 (    2)    0.0000 (    3)    3.1098 (    4)   10.0000
(    5)    9.4253 (    6)    6.2517 (    7)    3.1098 (    8)    9.4253
(    9)    5.5841 (   10)    2.4418 (   11)    2.4176 (   12)    0.0000
(   20)    0.0000

.......

  FREQ         VDB(12)

  4.000E+06   3.928E+01
  4.010E+06   4.001E+01
  4.020E+06   4.074E+01
  4.030E+06   4.144E+01
  4.040E+06   4.211E+01
  4.050E+06   4.273E+01
  4.060E+06   4.328E+01
  4.070E+06   4.374E+01
  4.080E+06   4.410E+01
  4.090E+06   4.435E+01
  4.100E+06   4.449E+01
  4.110E+06   4.454E+01
```

Fig 3 - part of SPICE output listing.

continued from previous page

statements. You can even enter simple equations using these variables.

Conclusion

The accuracy of the simulation depends on how well the "PSpice Circuit" matches reality. It's difficult to accurately model semiconductors at high frequencies, so don't try to model power amplifiers. For passive circuits such as filters and tuned circuits, it seems easy to get a good simulation of reality. I find it easier to experiment with circuits using PSpice, than to build the "real thing".

ar

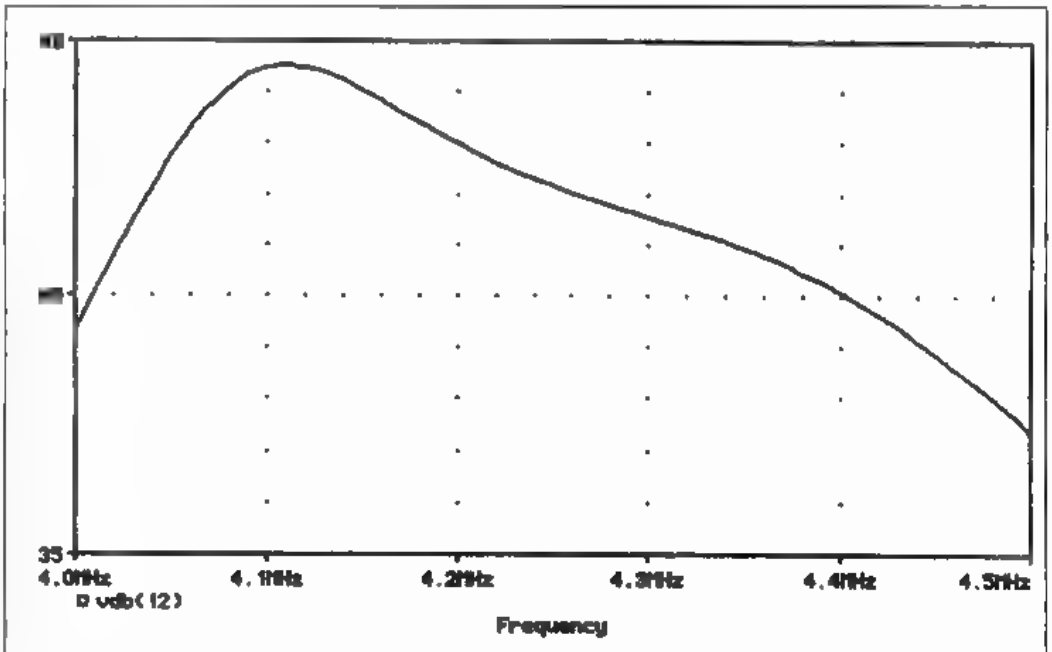

Fig 4 - "Probe" graph. Output voltage in db vs frequency.

Divisional Notes

VK1 Notes

Peter Kloppenburg VK1CPK

Forward Bias

As most of the members are aware, the Annual General Meeting (AGM) will be held on February 28, 2000 at the Griffin Centre, Civic, Canberra City. On that occasion committee members report on what happened during the previous year in their respective portfolios and their view towards the future.

During the proceedings, members of the committee will stand down and a new committee will be selected for the coming year. There are nine positions on the committee; President, two Vice-Presidents, Treasurer, Secretary, Immediate Past President, and three ordinary committee members.

Just as with State and Federal Governments, a number of functions will to be taken care of by individual members of the committee. They include Membership officer, WICEN coordinator, Education officer, Federal WIA Representative, Public relations officer, QSL Manager, Deceased Estate officer, Surplus Sales officer, Welcome officer, Broadcast officer, and Intruder Watch officer.

A really efficient division is supported by its members performing additional functions such as Slow Morse coaching, JOTA liaison, ALARA liaison, Contests and Awards officer, Seminars, Forums & Workshops coordinator, Novice Course coaching, A.R. Forward Bias writing, and Web Master of the Division's web site.

In line with other Divisions, the ACT has now appointed a Chairman for the ACT Technical Advice Committee, also known as ATAC. Any member who specialises in a particular field of communications or other field affecting Amateur Radio could become a member of this sub-committee. ATAC fulfills a number of functions such as bandplanning, EMC & Interference advice, Repeater & Beacon application approvals, and Licencing advice, etc, etc.

Many of these functions can be performed by members having an average range of experience in Amateur Radio. Obviously, the elected committee cannot do everything itself, but needs the active support of the members. If you feel you want to take up any of the functions mentioned above and help yourself and the Division, contact the President, Gilbert Hughes on (02) 6254 3266. Nomination forms for election to the committee are available from the Secretary, Peter Kloppenburg on (02) 6231 1790, or at the AGM.

VK2 Notes

Pat Leeper VK2JPA
patleep@bigpond.com

Members are reminded that the Annual General Meeting of the VK2 Division will be held on Saturday 15th April at Amateur Radio House, 109 Wigram Street, Parramatta. Nominations for Council and Motions on Notice will close on Saturday 4th March at 12 noon at the office at Amateur Radio House, Parramatta. Nomination forms for Council will be available from the office.

The first examinations for 2000 will be held on Sunday 20th February, with applications closing on Thursday 10th February. Application forms are available from the VK2 office.

The next Affiliated Clubs Conference will be on Saturday 6th May 2000, and follows a very successful conference held November last.

The December meeting of the Council was very much a "housekeeping" meeting as to be expected at the close of the year. For those who use the video library, the Council has ordered a set of the ARRL videotapes. When these arrive, they will become available for loan to affiliated clubs and individual members. Some of these are historical in nature, with at least one including Ross Hull when he worked for the ARRL, and others are of various amateur activities up to the present day.

The VK2 Division will be represented at the Central Coast Amateur Radio Club Field Day at Wyong again this year with the bookshop and deceased estate items. Come along and see the range of publications — the bookshop has something for everyone with amateur radio interests.

VK3 Notes

From: WIA Victoria vk3wi@rint.com.au

Harmonise the code licence standard – WIA Victoria

The Morse code proficiency test speed for Australian amateur radio licence qualifications should be 5 words per minute, says WIA Victoria, in response to the "winds of change" in Europe, North America and Africa.

WIA Victoria said that past surveys have shown that its members (and WIA members nationally) supported retention of the Morse code licence requirement, although support has declined steadily.

WIA Victoria President, Jim Linton VK3PC, said that Morse code as a mandatory licence requirement has been the most consistently debated topic in our hobby for five decades.The WIA Victoria, after considering a clear international trend during the past two years, and the views of its members in the last survey, is now supporting 5 words per minutes as the standard for all HF licences.

"It makes no sense for Australia to maintain its 10 words per minute standard when the United States has opted for five, and other nations or radio societies are considering similar measures," he said.

He was referring to a series of announcements over the past 18 months, the latest being by the US Federal Communications Commission in December 1999, that from April 2000, 5wpm will be the only code test speed for licences in the United States.

The Radio Society of Great Britain (RSGB) announced its policy in May 1998 that the code requirement be abolished, but as an interim measure 5 words per minute be an option for access to the HF bands by British radio amateurs. The RSGB has since achieved the introduction of a HF licence making 100W pep privileges available to those who qualify at 5 wpm. South Africa and Sweden are also among those proposing the lowering the code requirement to 5 words per minute.

While the International Radio Regulation S25.5 is a convention requiring a Morse code proficiency for operation below 30MHz, it does not specify a speed. Removal of S25.5 will require a decision at a World Radio Conference

VK4 Notes — QNEWS

By Alistair Elrick VK4FTL
WIAQ Councillor and QTC Editor

Amateur Radio Funday 2000

The Funday 2000 on Sunday 20th February (the weekend before Gosford Field day) is shaping up to be a very entertaining event. Brian Beamish VK4BBS is hoping attendees have those Crystal sets up and running and the foxhunters ready to fire up. The site at Centenary Lakes Park on Morayfield Road (UBD Map 57 Q-2) is ideal for FUNDAY 2000. It has shelters, toilets, playing area for children and lots of parking. Caboolture Station is a comfortable 10 minutes walk away. Why not go train mobile?

It starts 10.30am, finishing around 3-3.30pm The Caboolture Club President Mark VK4VG and his team have been burning the midnight oil to make this day a success; so bring the family. You will not be disappointed. The local Council required a $300 security deposit on the area which Caboolture have kindly offered to cover.

There are camping facilities for $3 per person per night at the local Scout Camp on Caboolture River Road, an easy 10-minute drive from the Funday site. There is room for tents, caravans and camper trailers plus a 13-bed dormitory and a large hall with full cooking facilities. The site has all conveniences, toilets and showers. There is a BBQ on Saturday night for campers: sausages, hamburgers & steaks plus salads, bread and tea & coffee for $5.00 per person. BYO any other drinks including beer or wine. Breakfast Sunday is $2.00 per person — notify Brian VK4BBS before 4pm on Saturday 19th February. Contact him via the WIAQ Office, Email, fax or phone.

What's at the Funday?

Free Electric BBQ's (BYO Drinks and Eats). Play area for the kiddies. Pleasant Walks, Fox Hunts, Club Station (on air). Crystal Set competitions. Pipe Band, Dancers and a singer plus more. Eyeball contacts.

As last year, all attending will be asked to donate a gold coin, or more, for the Royal Flying Doctor Service.

Now get those Crystal sets up and running! An aerial and earth will be provided to enable the Judges to evaluate the Xtal sets:

1. The Most Unique Working Crystal set
2. The Most Humorous Working Crystal Set
3. The Best Short-wave receiving Crystal set
4. The Best Crystal set built by a 13 year old or younger
5. Peoples Choice, where YOU get to pick YOUR favourite.

The WIA Bookshop will have a display but there will be no sales. This is a get-together and display event only for promotion and advancement of Amateur Radio. Clubs or Groups are invited to put on a small demonstration or club display. See you there!

The new WIAQ Inc

A chapter of the VK4 Division will close on 24th January with the wind up of the old WIAQ as a Company. The AGM of the new WIAQ Inc. will be held on 25th March, the new chapter continuing into 2000 and beyond. It is hoped that there will be sufficient nominations for 2000-2001 Council so all positions can be filled Note that the Council nominations need not only come from SE Qld area resident members. Telephone conferencing will continue to involve all sections of the Division.

While the VK3 10m beacon on 28.2565 MHz is fully operational from 30 km NE of Melbourne and VK4RTL beacon in Townsville on 28.270 MHz has been refurbished and putting out 5 Watts, they can possibly not be heard consistently at each other's location. Nevertheless good 10m contacts have been made between VK3 and VK4 during the early part of this summer. The local Brisbane 10m repeater on 29.660 MHz, which is linked to the Southside 2m repeater on 147.075 MHz, has been very well utilised when openings are on to VK3 and VK5. The local activity on the 2m side will pass to the 10m repeater so it does have the effect of a beacon. But it is always worth a CQ call to see if the band is open, even if you can't hear the Beacons.

Remember, if your Club or Group has an event coming up, contact QNEWS or QTC to publicise it. Give at least 2 month's notice to QTC because of lead-time on publication. One month is required for QNEWS, so it can be repeated over several broadcasts, closer to the event date. This is open to all sources.

QNEWS
Email: qnews @ powerup.com.au or
Packet: QNEWS @VK4WIA.BNE.QLD.AUS.OC

QTC
Email: qtc@wiaq.powerup.com.au
or by Post to PO Box 638 GPO Brisbane Qld 4001 and mark the envelope attn QNEWS or QTC.

73's from Alistair

VK6 Notes

Notice of the Annual General Meeting for 2000

It is hereby notified that the Annual General Meeting of the Wireless Institute of Australia (Western Australian Division Incorporated) will be held from 10am on Saturday 15th April 2000 prior to the 3rd Gathering of Clubs followed by a social afternoon. Non-members welcome.

The venue for these events will be the R.S.L. Hall on the corner of Fred Bell Parade and Playfield Street, East Victoria Park.

The agenda will be.

1. Consideration of the Council's annual report
2. Consideration of the financial report
3. Consideration of other reports
4. Election of office-bearers (President, Vice President and seven other Councillors)
5. Election of two Auditors
6. Appointment of a Patron
7. General business which has been duly notified.

Notices of Motion for the AGM must be received by the Secretary not less than 42 days prior to the meeting (ie by 4th March 2000), and must be signed by at least three members.

The Secretary's postal address is WIA WA Div. PO Box 10 West Perth WA 6872.

Nominations of candidates for election to Council must be received by the Secretary, in writing, not less than 42 days prior to the meeting (ie by 4th March 2000), with an intimation that the candidate is willing to act.

A candidate may submit a statement, not exceeding 200 words, outlining his or her experience and case for election. Each nomination shall be signed by two members proposing the candidate. Candidates must possess a current licence.

Any financial member who is entitled to vote may appoint a proxy, who must also be a financial member who is entitled to vote, to speak and vote on his or her behalf. Written notice of such proxy must be received by the Secretary prior to the meeting, and be in the following form:

> "I (*full name*), a member of the Institute, hereby appoint (*full name*), also a member of the Institute, to act for me as my proxy, and in my name do all things which I myself being present could do at the meeting of the Institute held on the 15th April 2000.
>
> Signed:
> Witness:
> Date: "

VK7 Notes

End of Year in NW VK7

The VK7 end of year activities were well attended. The accompaning photographs were taken at the Tasmanian Division (North-West Branch) Annual Christmas Dinner. The occasion was used to present the Joan Fudge Memorial Award for service to the Division to the Treasurer Terry Ives, VK7 ZTI. This was reported in the January 2000 VK7 Notes Joan Fudge was a very good Branch Secretary in the early 80's. She died of cancer and the Division decided to remember her with this Service Award.

Thanks to all of you

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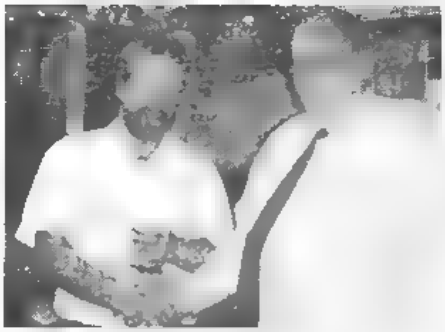
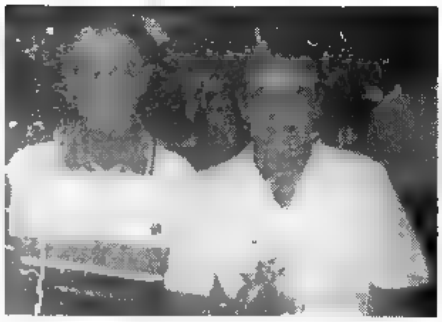
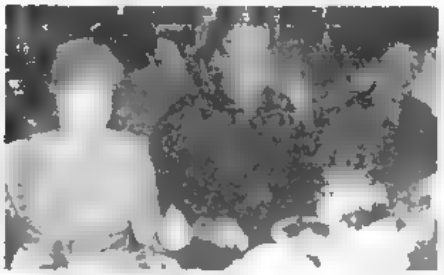


The VK7 Branch President, Robert McCullouch, VK7MGW presenting the Joan Fudge Memorial Award for service to the Branch in 1999 to VK7 Treasurer Terry Ives, VK7ZTI. Refer January AR 2000



Two Launceston (Northern Branch) visitors, Terry Brundle, VK7U, and XYL Silvia.

Three Old Lags, Bob Cropper, VK7BY, Syd Medford, VK7SF and Ken Hancock, VK7KH.



VK7 State and Branch Secretary (also FTAC) Tony Bedelph, VK7AX flanked by XYL Rosemary and Max Hardstaff, VK7KY

VK7 JOTA co-ordinator, Kirby Cunningham, VK7KC and XYL Gai, VK7NGC

Taking Tea with the Ladies

(and any gentlemen who care to come along)

Gippsland Technical Symposium July 1999, Spouses' Tour

Pauline Corrigan VK3XBG's YL

I would like to let the wives know about our Spouses' Tour held on 10 and 11 July while the men were busy learning technical stuff

It started last year, and two came back this year, Ruth from Oakleigh and Sigrid from Canberra. There were nine in all.

Saturday

We started with a drive to Yarragon, where we browsed through the antique stores and gift shops. We had lunch at the Yarragon Hotel before driving to Jindivik to buy some smoked meat from the smoke house. This is also a great place for afternoon tea.

The countryside here is magnificent. From there we went to Neerim South to the cheese factory for afternoon tea, and to buy a selection of cheeses. Then I had to head back to Churchill to go to work at 6pm. The weather was fantastic.

Sunday

We went to Morwell Sunday market for a browse. The weather was a bit overcast and by the time we were ready to go, the rain had started. We drove to Traralgon to go to the cheese factory, but it was closed. We checked the Traralgon antique shops before heading back to Churchill for a barbeque lunch with the men.

Next year

We will be going to a winery up in the hills where we will get to taste some fine wines and sample some of the best Black Forest cake I've ever tasted. The spouses have also asked if I will open up my home as I own approximately 3,500 clocks besides the other antique junk I collect. This will be happening, though I think this is worse than going to an antique fair. We will have lunch while you're browsing, ladies, but I don't sell my junk. So less travel next year, but plenty to whet your appetite still I would really appreciate an idea of numbers though, as our winemaker is 78, and I also may have to hire a bus, depending on numbers attending

Thank you to all who attended — Nicola, Port Fairy, Aileen, Burwood, Phyl, Tassie, Jenny, Upper Beaconsfield; Bev, Hansonville, Ruth, Oakleigh; Sigrid, Canberra, 'June' Hope you can come next time.

ALARA

Christine Taylor VK5CTY
ALARA Publicity Officer
6 Fairmont Avenue, Black Forest SA 5035
Packet: VK5CTY@VK5TTY
email: geensee@picknowl.com.au

Did you have any millennium bug problems?
How about this story from the New Scientist 18th Dec 1999:

One of the showcases of Britain's millennium celebrations is the London Eye, the huge Ferris wheel dominating the Thames close by the Houses of Parliament. Some may disagree, but Feedback thinks it is a dramatic structure entirely in keeping with its millennial role.

Or is it? Bookings for trips on the wheel can already be made on the Web, so a colleague of reader Alan Harding tried to buy tickets for 29 February 2000.

But she found that this date was not available.

After a long series of phone calls, she got through to a human operator, who had to confess that the software was unaware that 2000 is a leap year.

Should we be amused that the millennium wheel's booking software isn't Y2K compliant - or should we be worried?"

New Year's Eve or The Start of the New Millennium?

Were you involved in the WICEN nets? We were part of it up at our country block. Fortunately it was not necessary to do anything more than be available. Perhaps the politicians and technicians got it right after all

Whether you think we have now moved into the third millennium or whether you are still "twelve months short of a millennium", the rollover to the year 2000 was watched with bated breath all around the world.

Did you check out your computer? Did you have your computer on as the numbers changed? Did you fill a jerrycan with petrol? Did you fill your pantry shelves? Did you get a hard copy of your bank statement? Lots of people did any or all of those things. If so you were all good Boy Scouts or should that be Girl Guides?!!

Now to other matters:

Don't ever complain about having to learn Morse Code!!

Kay Robertson ZL2BRW (now, sadly, a silent key) suffered from multiple sclerosis which eventually caused her to become blind and paralysed. It was while she was in bed that she became interested in ham radio. She studied for and passed the theory and regulations with help from local amateurs, but until she had gained her Morse accreditation she could not talk to overseas amateurs.

Because the disease eventually made it impossible for her to write, She learned to repeat messages sent in code, orally. That is the way she had to do her exam - and she passed it, too!

So next time you feel like moaning about having to do Morse, stop and think about Kay.

(Reprinted from June 99 WARO Bulletin)

Some Christmas Stories

These are from the Monday night ALARA Net.

The unseasonable weather - in the South it was much too cold for Christmas and the New Year, in the North and West it was too wet. I suspect that the weather bureaux told us all that it was quite average for the month but we don't think of it by the month, only by the date. Certainly, in VK5 we had several very hot days immediately before Christmas so they would have brought the AVERAGE up to normal, but not the date.

The Christmas card stories: Two cards sent to the same person. Cards sent by both partners to the same address. The card that came from someone you had left off your list. The special homemade cards sent to special people or the handmade cards from your children or grandchildren.

But probably the story that takes the cake is this one. A card came from someone she had forgotten so she immediately wrote out a card for them and went out to post it. When she got home from the post box she discovered that the newly written card was still on the table. She had posted the card she had received

Have you got stories like these? Probably.

The varied topics of interest on the Monday Nets is quite amazing. Why don't you join in? If you are shy, just remember we have all felt just as strange as you do because we all joined in for the first time, sometime

YLs are welcome, of course, but OMs are also welcomed once we have had a couple of rounds to ourselves

We start at 1000Zulu during Daylight Saving months and at 1030Zulu in the winter months on or about 3.580MHz.

Remember, when you have obtained 10 YL contacts (from 5 states) you can apply for the ALARA Award (OM and YL operators are eligible) If you want proper contacts for this, just ask us and we will stay after the Net closes to give you a formal signal report.

40W MOSFET HF Linear Amplifier

Drew Diamond, VK3XU
45 Gatters Rd., Wonga Park, 3115.

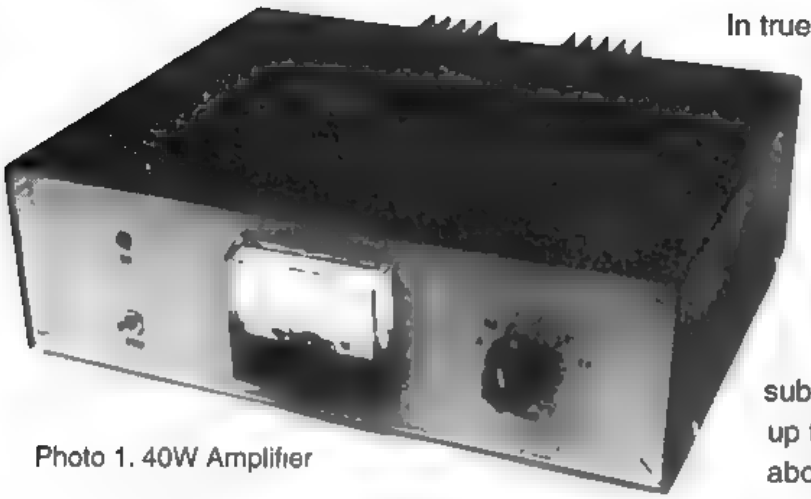


Photo 1. 40W Amplifier

In true amateur tradition, experimenters continue to develop medium-power RF amplifiers using cheap and commonly available power MOSFETs, generally those in the IRF type number series, intended for power supply and switch service. The IRF510 was identified very early as a likely device applicable to HF linear amplifier work. But published designs could only provide substantial amounts of power, about 20 to 50 W, up to perhaps 14 MHz (see Refs. 4 - 9). Beyond about 14 MHz, output was significantly reduced.

THE MAIN PROBLEM with these MOSFETs is their rather large gate-source capacitance (150 pF for the IRF510), which makes driving the highly capacitive gate an increasingly difficult job as frequency is raised. One radioman, Rod Green, VK6KRG, cracked the problem early by cleverly absorbing this unavoidable capacitance into the gate input network (Refs. 1, 2 and 3), thus obtaining useful gain for his single-ended IRF510 amplifier at 21 MHz.

For a while it seemed that we had pushed the IRF series to their limit, then Jim Wyckoff, AA3X, provided details of his 30 W 3.5 MHz amplifier (Ref. 9), which apparently gave spur to renewed efforts by other experimenters. One of these, Mike Kossor, WA2EBY, published details of his circuit in the March issue of QST (Ref. 10), which gives full 1 8 - 28 MHz coverage. As far as I know, Mike's design is a notable improvement on all previous broadband amplifiers using IRF devices. Until the advent of his pattern, most circuits were of similar configuration (Refs. 4 to 9), where, apart from terminating the gate-gate input of the push-pull pair with some low impedance, no attempt was made to absorb the gate-source capacitance.

Having been shown the way, the following amplifier was built. As some components are not easily available here, adaptations have had to be made to suit parts availability. Despite one or two compromises as a result of parts difficulties, figures very similar to the QST model have been obtained:

Performance

Output Power:	At least 40 W, 50 W on some bands.
Input Power:	Nominally 2 W.
Gain:	About 13 dB.
Frequency Range:	Amateur bands from 1.8 to 28 MHz.
Spectral Purity:	With the suggested filter; all harmonics at least -40 dB.
Duty Cycle:	50 %.
Load Tolerance:	Withstands high SWR for reasonable periods.
Power Supply:	Nominally 30 Vdc at up to 3 A.

In CW and SSB service, linearity, as observed on an oscilloscope is shown to be very good- SSB has nicely rounded peaks and good zero crossover characteristics. Checked on a receiver, no significant splatter or clicks occur provided that the amplifier is not over-driven.

Circuit

A pair of IRF510 devices are connected in push-pull class B configuration, as shown in Fig. 1. A 3 dB attenuator (6 dB return loss) is inserted at the input in order to absorb much the reactive nature of the gate to gate impedance, and thus provide a more resistive load for the driving exciter. Broadband transformer T1 converts the unbalanced input to a balanced drive for the gates of the MOSFETs.

Two effectively series-connected 27 ohm resistors terminates the gate to gate input. Each 27 ohm resistor has a 390 nH peaking coil in series which, at the high HF end (broadly around 21 MHz) resonates with the 150 pF input of each gate, thus effectively reducing the effect of this capacitance at the HF end of the amplifier's response.

For class B operation, the enhancement-mode MOSFETs are biased just to the point of conducting drain current. The 5 K potentiometer is connected across a 5.1 V zener derived source to provide a stable bias voltage.

Drain current is supplied via broadband choke coil T2, connected such that it is effectively a high impedance between the drains. Fortuitously, the drain to drain

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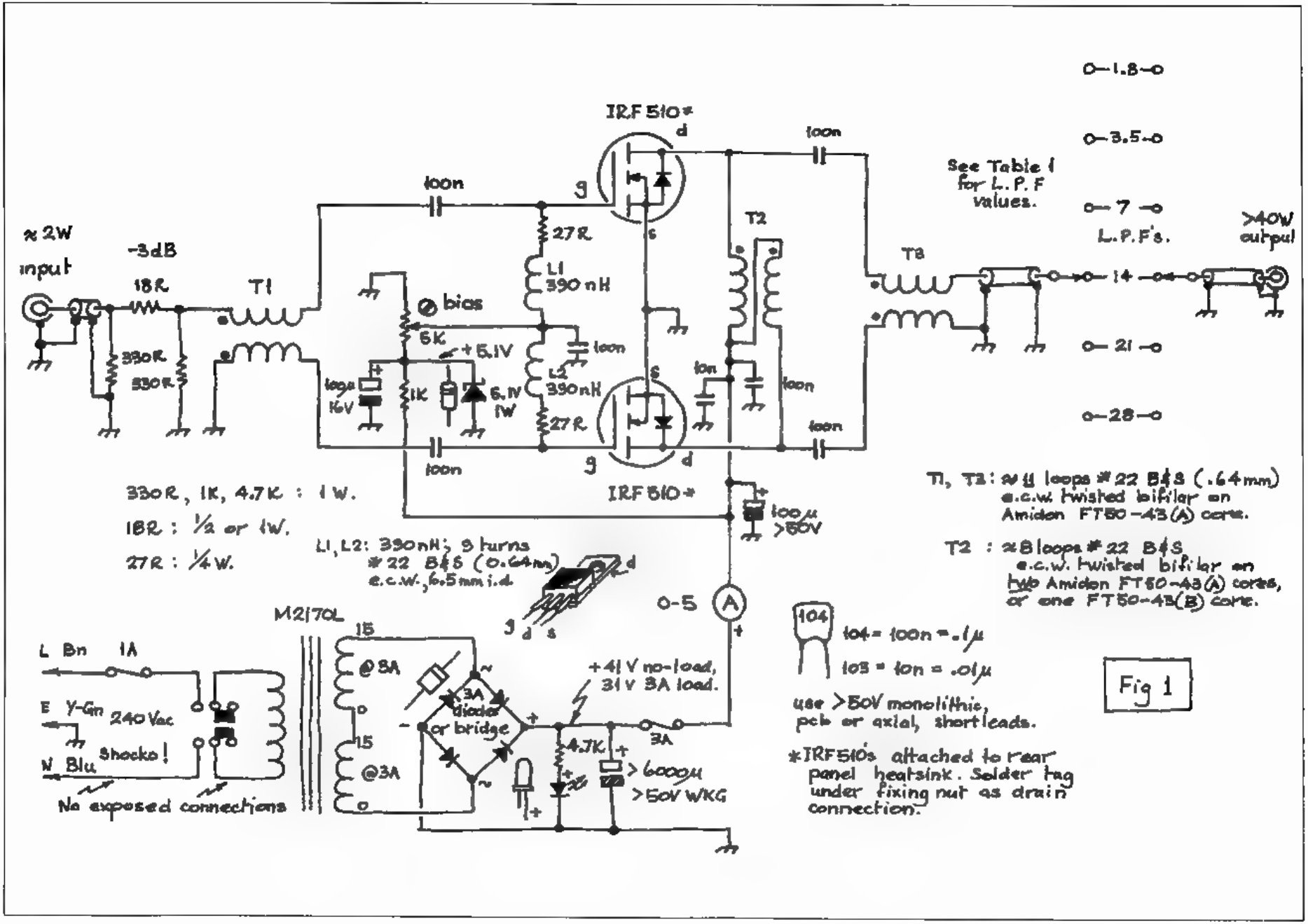

Fig 1

Figure 1

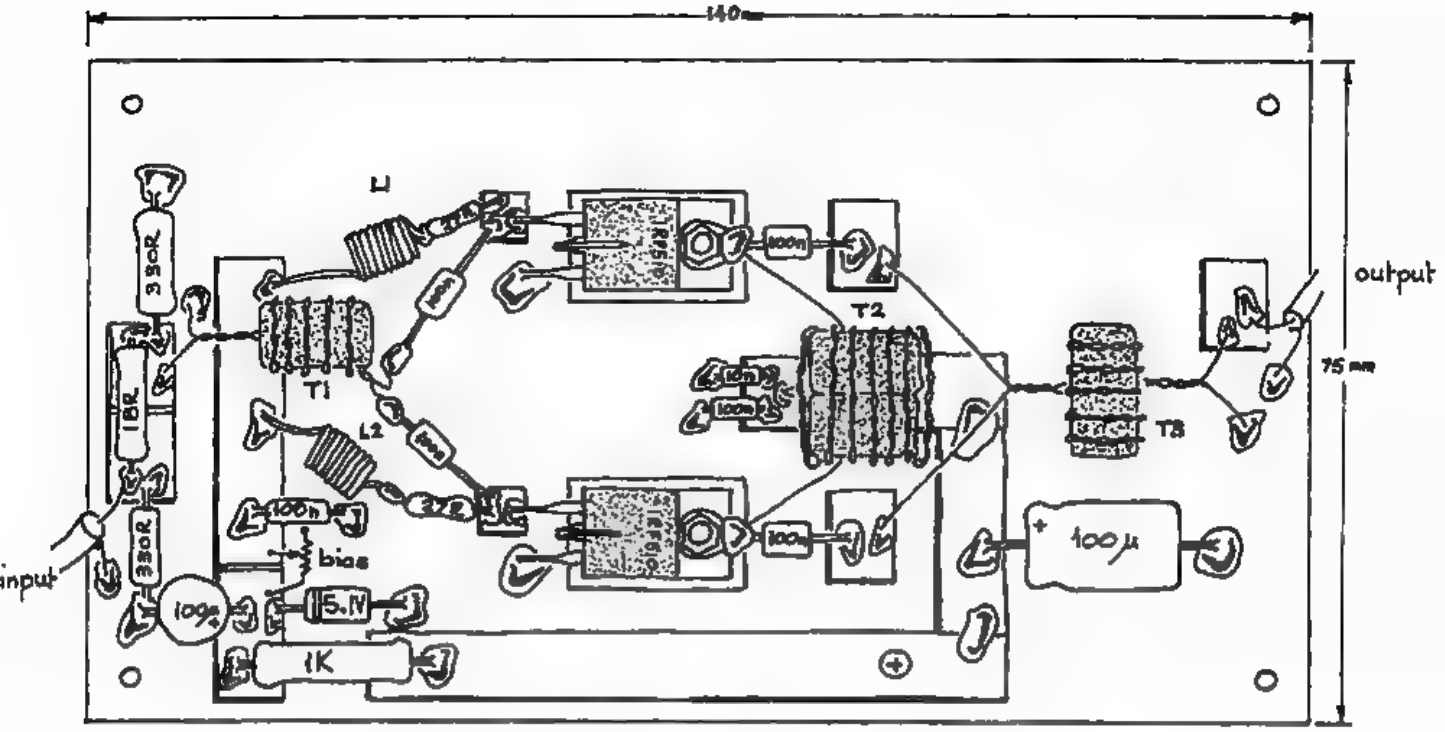

Figure 2. Amplifier "Paddyboard" Layout

continued from previous page

impedance is near 50 ohms, so that a 1 : 1 broadband transformer T3, identical to T1, is all that is necessary to couple the balanced drains to the unbalanced load.

Significant amounts of harmonic energy can be generated by this configuration, so it is mandatory that the output signal be put through a low-pass filter to reduce these harmonics to a suitably small level. It is generally agreed that harmonics should be at least 40 dB below the main signal (i.e. for a 50 W signal, the harmonic is less than 0.5 mW). An ordinary 5 or 7-element low-pass filter may not provide this degree of attenuation. Therefore, for this project, "improved second-harmonic optimised filters", designed and described by Ed Wetherhold, W3NQN (Ref. 11) are specified here. Interestingly, provision of a low-pass filter for each band always substantially increases the real output power obtained on that band.

A "stiffly" regulated power supply was found not to be necessary. Supply requirement of nominally +30 Vdc at up to 3 A (maximum load) is provided by a mains step-down transformer which supplies 30 Vac. After full-wave rectification and smoothing, a voltage of about 31 Vdc is obtained when the amplifier is drawing 3A. A fuse is connected in series with the (+) rail to cut supply should a fault occur.

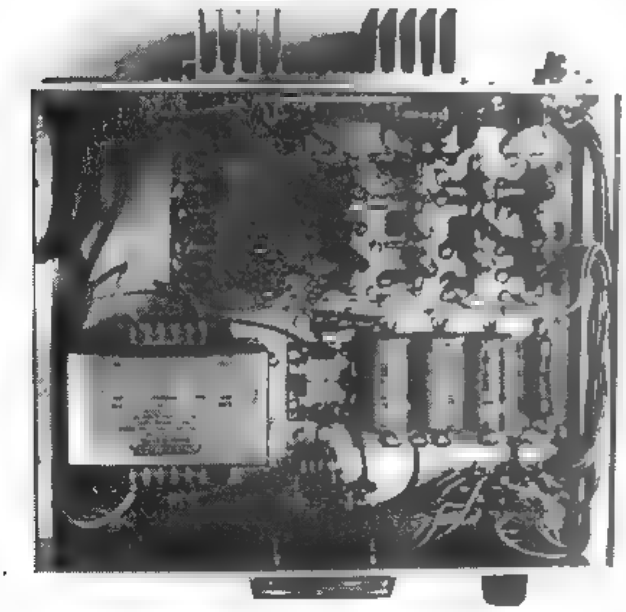

Photo 2. Internal view

Construction

Photos 1 and 2 show a suggested enclosure which measures 250 x 195 x 78 mm WDH. Front and rear panels are of 4 mm thick al. sheet, which are connected front to back with 12 mm square al. rod. The bottom panel and cover are of 1.5 mm al. sheet (check the off-cuts bin at your local al. merchant). This arrangement allows easy service access to the rear-mounted amplifier board, both during and after assembly. The cover has 49 x 6.5mm vent holes drilled in the top, and 17 holes in each side.

The amplifier board, which measures 140 x 75 mm, may be double or single-sided p.c. material. The components are mounted "paddyboard" style (see Ref. 12). Component layout is shown in the plan view Fig 2.

Broadband transformers T1, T2 and T3 are made as follows. Take two straight 300 mm lengths of 0.64 mm enamelled copper wire (e.c.w.). Lay them parallel, then fix one end of the pair in a vice. Twist the free ends together, then fix that end in a drill chuck. Whilst keeping the wires taut, turn the drill until you have about 3 twists per 10 mm. Firmly pull the drill to set the twist, then remove the pair. For T1 and T3, carefully wind the pair onto an Amidon FT50-43 (A) core- 11 loops should fit nicely. Trim the leads to about 20 mm each. T2 is wound similarly, this time using a two core stack, or one FT50-43 (B) core- about 8 loops. The

end of one winding must be connected to the start of the other, which becomes the (+) 31 V connection. Winding starts are shown on the circuit with a dot.

Heatsinking for the IRF510's is essential. The amp. board is attached to the rear panel as shown in Photo 3. 60 x 6 mm cut-outs in the amp. board allow the MOSFETs to be attached to the rear panel, which acts as partial heatsink. Use TO220 silicone-impregnated insulating washers at the interface between each device and rear panel. A solder tag under the device fixing nut provides the drain connection. Additional dissipation capacity is had by fitting a Jaycar HH8566 (or similar) 72 x 110 mm heatsink to the rear panel. Provide holes in the heatsink assembly to permit easy fitting of the MOSFETs, which should be installed after the amp. board and heatsink have been fixed to the rear panel. Remember to check that your soldering iron tip is properly earthed before soldering the MOSFETs into circuit (these devices- in my experience, do not appear to be super-sensitive to static damage, but you should observe normal anti-static precautions).

The wiring of the low-pass filters is fairly critical. As they are 50 ohm input and output devices, the best plan is to use a 2-pole, 6 (or more) position wafer switch for band changing, and miniature 50 ohm coax for the interconnections. The braid should be grounded at each end of its run, so that there are no interruptions to the continuity of the outer conductor. The clicker-plate would make a handy point to solder the braids around the wafer switch. The impedance of ordinary shielded wire is close to 50 ohms, and makes a reasonable substitute.

Table 1 shows the values required for each LPF. If you only need certain bands, then simply make a filter for each band

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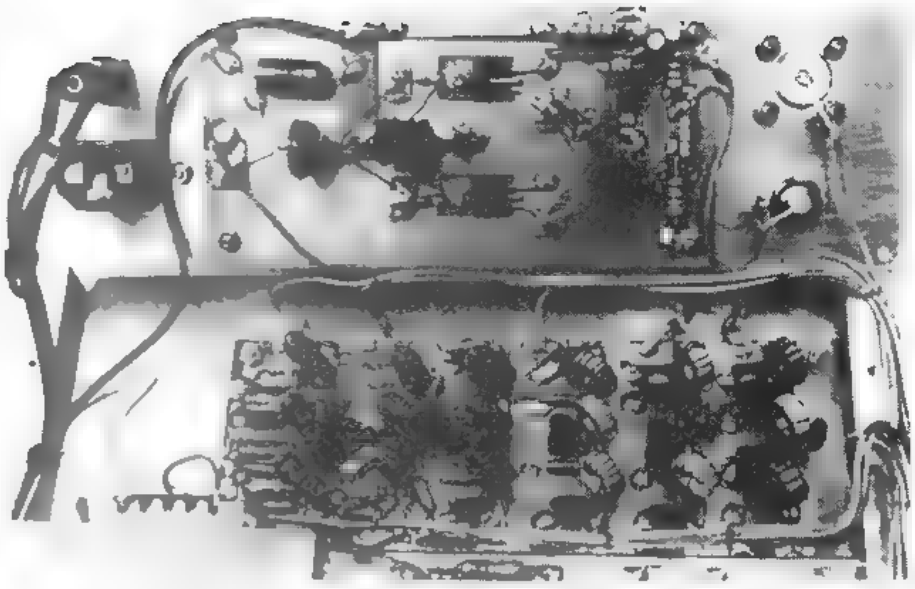
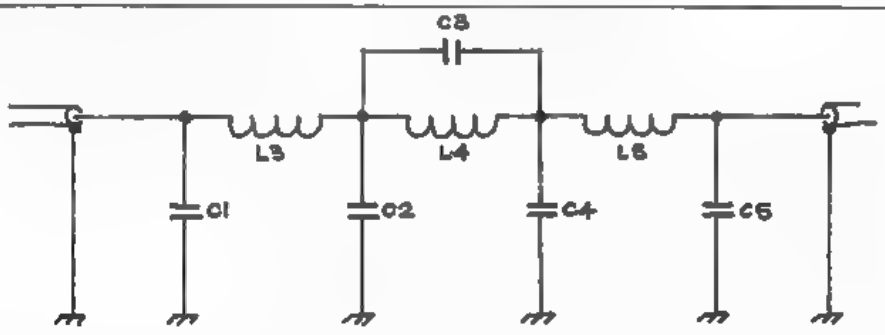


Photo 3. Amplifier and filter boards (rear panel folded down for clarity



Band MHz	C1, C5 pF	C2, C4 pF	C3 pF	L3, L5 µH	L2 µH
1.8	1500 + 150	2200 + 330	330 + 47	5.2 28t occupy ¾ T68-2 core.	4.7 26t occupy ⅜ T68-2 core.
3.5	470 + 390	1200 + 100	150 + 47	2.7 21t occupy ⅜ T50-2 core.	2.4 20t occupy ⅜ T50-2 core.
7.0	330 + 100	330 + 330	100	1.8 14t occupy ⅜ T50-2 core.	1.2 14t occupy ¾ T50-2 core.
14	220	330	47	0.67 10t occupy ½ T50-6 core	0.6 10t occupy ⅓ T50-6 core.
21	150	220	33	0.45 8t occupy ½ T50-6 core.	0.4 8t occupy ⅓ T50-6 core.
28	100	82 + 82	27	0.33 7t occupy ½ T50-6 core	0.3 7t occupy ⅓ T50-6 core.

All coils wound with #22 B&S (0.64mm) e.c.w. T68-2 is a red core, ≈ 0.68" dia., T50-2 is a red core 0.5" dia., T50-6 is yellow, 0.5" dia.

Table 1. Low-pass Filters

continued from previous page

required. Details are not shown for 10.1, 18 or 24 MHz. See Ref. 11 if you need these bands also. Ordinary 0.5" T50-2 and -6 Amidon cores were found to be quite adequate to the 50 W power level, except those for the 1 8 MHz filter; 0.5" cores saturated and became hot. So I have specified 0.68" (T68-2) cores for top-band.

Photo's 2 and 3 show how the filters are made and wired. The filter board measures 170 x 75 mm. There are six "paddyboard" strips each 60 x 6 mm which are divided evenly into four segments, to which are soldered the filter components for each band. Ideally, the filter capacitors should be silvered mica types- use these if available. However, styroseal/polystyrene are quite suitable, more readily available and cheaper than mica's. And if you can't get styro's, then ceramics will do- but not the little 50 V ones generally available. To withstand a load SWR of more than 2, the capacitors must be 100 V, and preferably 500 V.

If you already have a power supply which can deliver 30 Vdc at 3 A, then an internal supply is not required (incidentally, the amp. will work quite well from a 13.8 Vdc supply- expect about 15 W). However, for convenience, and to avoid tying up a general-purpose supply, a dedicated internal 30 Vdc supply is recommended. The transformer, type M2170L, rated 30 Vac at 3.3 A, which has top mounted secondary terminals, and "flying leads" for mains, was purchased from Altronics. But any similarly rated transformer should do. The power supply diodes, three 2200 uF/50 V smoothing capacitors, 3AG fuse holder and 4.7 K/ 1 W LED dropper/bleeder resistor are mounted paddyboard style on a board which measures 120 x 60 mm. To prevent accidental contact, use heat-shrink tube (or similar) to cover all exposed mains wiring connections.

As there are numerous requirements for antenna changeover (from transmit to receive) depending upon transmitter, or transceiver type, just how this job is done must be left to individual builders. Ref. 10 has details of an elegant solution to the problem, and may well suit your set-up.

Operation

Visually check all wiring, component locations, and polarities where applicable. Remove the 3 amp fuse. With your multimeter on ohms, check, by measuring resistance to ground; that the drain tabs have not punctured the silicone washers (but note the protection diode internal to the '510).

Apply mains power. The LED should glow. Measure the voltage across the smoothing capacitors- should be about 41 Vdc. Switch off, then install the fuse. Connect a suitable dummy load or 50 ohm power meter to the amplifier's output. Set the bias pot slider to the "earthy" end of its travel (minimum bias voltage). Switch on. There should be little current indicated on the ammeter. Carefully adjust the 5 K bias trimpot so that drain current just begins to show on the meter. Set it for about 200 or 300 mA (0.3 A).

You will need an "exciter" capable of 2 or 3 watts output power to drive the amplifier. Switch in the amplifier's LPF appropriate to the band in use. Apply an input signal from the exciter, adjusting the drive upwards from zero if possible. You should observe a smooth rise in drain current, and a corresponding rise in output power. At 2 W input, the drain current should be about 3 A, and output power should be about 40 or 50 W.

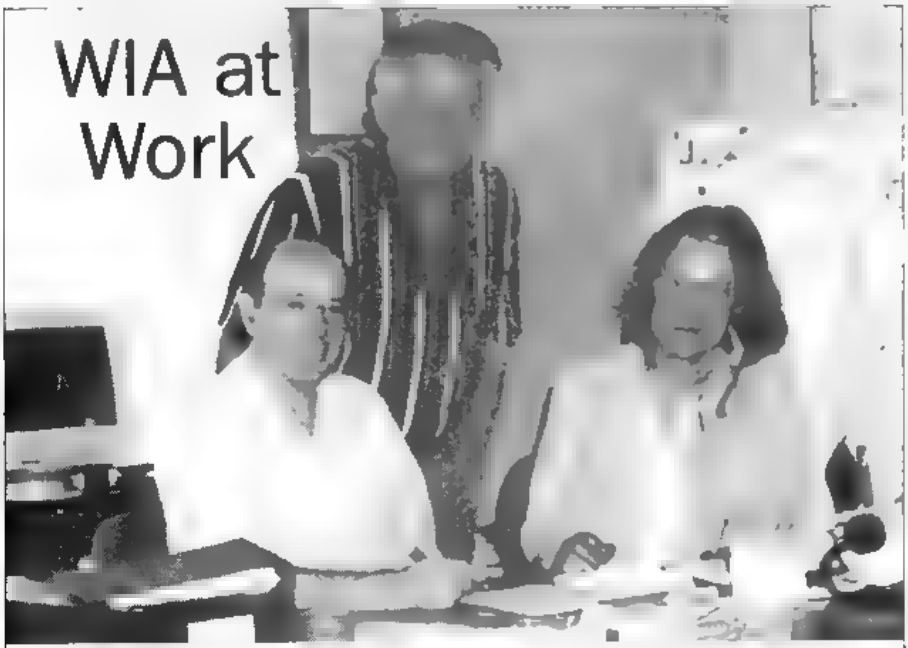
In actual "on-air" operation, the load SWR ought to be kept below 2, but no damage should result from operating into a moderately high SWR load for short periods. After a long transmission, the no-signal drain current may creep up to perhaps 0.5 A, but should drop back after a cooling period.

Parts

The standard components are available from the well known electronics suppliers, such as Altronics, Dick Smiths and Jaycar. Additionally, Electronic World (03 9723 3860) can supply the IRF510's, Amidon cores and styro capacitors. See Hamads in this journal for other Amidon suppliers. Rockby Electronics (03 9562 8559) have some mica capacitors and many of the standard parts.

References and Further Reading:

1. "21 MHz QRP 'Maxi' RF Power Amplifier", R. Green, VK6KRG, Low-Key (journal of the VK QRP Club) #3, Sept. '84.
2. "How to Design RF Power Amps", R. Green, Low-Key #4, Dec. '84.
3. "Forrestfield" 21 MHz Transmitter; R. Green; Low Key #27, Sept. '90.
4. "MOSFET Power Amplifier for 1.8 - 10.1 MHz", Diamond, AR Oct. '88.
5. "Power FET Switches as RF Amplifiers", D. DeMaw, W1FB, QST Apr. '89.
6. "Power Amplifier using MOSFETs", L. Butler, VK5BR, AR Nov. '89.
7. MOSFET Amp. in Tech. Correspondence, Hayward and Damm, QST Nov '89.
8. "25 W MOSFET Linear Amplifier", Diamond, AR Jan. '91.
9. "1 W in, 30 W Out with Power MOSFETs", J. Wyckof, AA3X, QST Jan '93.
10. "Broadband HF Amplifier Using Low-Cost Power MOSFETs", M Kossor, WA2EBY, QST Mar-Apr '99
11. "Second-Harmonic Optimised Low-Pass Filters", E. Wetherhold, W3NQN, QST Feb. '99.
12. "Paddyboard Circuit Construction", Diamond, AR Feb. '95.



From left: John Loftus, Wally Howse and June Fox during a Directors' Internal audit of the Federal office, September, 1999

Quo Vadis Morse II?

Over the last 20 years I have heard many people say, "I couldn't do that" (learn Morse). Why? These people are no different from their parents or grandparents who learnt things like Morse if it were part of their job

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E-mail: <contests@radiomag.com>

A FEW WEEKS AGO I had a phone call from a chap I had known well many years ago. We lost touch, except for a card at Christmas.

I did know that in those days he was a pirate on several Amateur Bands. By his own admission he "enjoyed a good chat" and "40 metres was the best band".

The purpose of the call was to enquire whether Morse had been dropped from the VK licence, as he had an opportunity to buy a complete Ham station at very modest price.

This saddened me, as he obviously had an interest and was not without some ability — he ran a farm and learnt to sail and fly. Yet he apparently wanted a world-wide citizen's band. The interest was there, but not the WILL to learn the code, even if he did not intend to use it.

Over the last 20 years I have heard many people say "I couldn't do that" (learn Morse). Why? These people are no different from their parents or grandparents who learnt things like Morse if it were part of their job, without squealing. They got to and did it!

More recently Morse (or CW as we prefer to call it) has passed from general commercial usage and many countries are grappling with decisions as to whether it should stay a requirement for HF Amateur licensing.

Historically Samuel Morse hit on a wonderful way of getting information from one place to another — a way that was proven reliable and efficient. Whole countries came within reach of people. Ships and planes in far places had greater chance of being in touch with the world and, most importantly, of being aided in the event of trouble.

Our Q Code grew from the use of Morse and over the years techniques for sending and receiving were improved. Fine and rightly so, but we cannot live just on history.

Present Usage

1. In our part of the world, CW has gone from the Maritime, Aeronautical and Armed Services, except for a handful of stations in China and some other continents. (I personally miss the listening practice, but there are other ways to make up the loss. See? Again WILL —DETERMINATION.)
2. Here in VK we are very fortunate to continue the **"CW Net"** — a long-running Net on 7025 kHz every Sunday morning at 1000 hours Eastern clock time (2300z Saturday during Summer Time and 0000z Sunday in normal time).

   This Net will not only give opportunities for as many QSOs as you want, but makes most efficient use of band space.

   The Net Controller pairs off stations on a nominated frequency. When the QSO is over, those stations can either go QRT or re-sign with the Controller and get another QSO. If you think that CW is dead in VK, try listening to 40 metres on a Sunday morning. You will also hear how nets can be made much more interesting and efficiently run.
3. **QRP (Low Power Operation)** is a good way to try Morse and simple set construction. Most operation is on 80 metres at night, which makes copy a bit difficult because of band conditions in Summer; but there are some chaps around on 40, 30 and 20 metres. I have operated 12 metres with good success in recent years.

   There would be more operators experimenting with modern construction techniques for QRP CW today than any other area of Amateur Radio. Morse is certainly not dead for them!

   I have even heard of a well-known Ham who is planning an add-on box for a 2 metres rig to send CW, so that younger operators can practise. CW is certainly not dead for him, neither is his desire to help others to get ahead.

   You may like to have a look at the QRP Club's Home Page at

   http://www.users.on.net/zietz/qrp/club.htm
4. **Collectors** pop up in almost every hobby and there are those who collect hand keys, paddles, sounders, etc. Have you ever seriously read the "Pounding Brass" column in 'Amateur Radio'?
5. Today, **computers** can generate Morse — and do it very well provided that the machine is talking to another computer. Most humans do not have an innately good sense of rhythm; but that did not stop all sorts of people from becoming good Morse operators.

One of the most interesting experiments I ever did was to compare computer-generated Morse at 99 wpm with RTTY using the same equipment, path, frequency and operators. The Morse came out in front.

Computers are heavily used in contesting today for a variety of functions, particularly log-keeping, but including Morse generation.

Whither?

As our title asks, "What of the future of Morse Code?"

My own feeling is that it will never completely die out. It will be the Amateur Service that keeps it alive, because I feel that there will always be an Amateur somewhere who feels the urge to tinker with the Code — even if it is by computerized means.

The only rider I would add to the above is that Morse may teeter for a while should there come the world-wide removal of the Amateur Service; but even then I still feel that there will be pockets of it that will survive somewhere.

But much more importantly, what is your attitude? What will you do? Will you support the WIA by providing your opinions so that it will know how to represent us all? Will you support the QRP Operators' Club in its aims? Or will you be a victim of complacency? "I'm all right, Jack." "They'll fix it." "I don't care."

The future of CW (and indeed of Amateur Radio) rests fairly and squarely with US — ALL OF US. If you enjoy your hobby, please USE IT; but at the very least let's start having some serious discussion on the topic.

BT

An Experimental Low Frequency Band Transmitter

Lloyd Butler VK5BR

Early in 1997, with the help of Harry Krause (VK5HK) I took some steps to experiment with test transmission in the Low Frequency (LF) region of the radio frequency spectrum. The plan was to transmit from the QTH of VK5HK which is the old coastal radio site (previously VIA). The site has an ideal vertical antenna tower for the purpose and Harry was happy for this to be used for the tests in conjunction with other facilities he has on site. I discussed the previously in my article on the LF bridge (*Amateur Radio* October 1998 – reference 1).

AMATEUR LF BANDS have been approved and are already in use in various countries around the world such as the United Kingdom, New Zealand and countries in Europe. ARRL have applied for approval in the USA and the WIA have made approaches to the authorities in Australia. In the absence of an amateur licence approval we did consider a scientific licence as granted to several other experimenters in Victoria and Tasmania, but the licence fee has been increased and operating conditions looked a bit restrictive

All in all, I guess we just let the project ride, hoping that WIA would succeed in their bid to get an LF band allocation However, I did build a transmitter ready to send out the test signals. So far it has done no more damage than heat up my dummy load but I thought it was high time its design was committed to the documentation which follows

The transmitter has been designed to operate within the frequency range of 160 to 200 kHz, essentially to correspond with our nearest LF active country New Zealand which has a band approval of 160 to 190 kHz. (If Australia gets approval outside the range, say 135-138 kHz as in the UK, then I guess the transmitter range will have to be modified).

The transmitter power amplifier can deliver 70 Watts of RF power via a 25 Ohm 220 khz LP filter into a 25 Ohm resistive load (The power output could be increased to 100 Watts if the output circuit were changed to suit an 18 Ohm load).

It was proposed to operate the transmitter to air in a keyed continuous wave (or CW) mode from an auto-keyed pre-programmed Morse ident signal. Provision has been made to key from either audio tone or direct DC control. The RF power amplifier operated in a linear mode and hence the transmitter circuit could also be arranged to accept a speech modulated RF signal such as AM or SSB instead of the continuous RF signal now taken from a VFO.

The transmitter was constructed almost completely from components I had available around the radio shack. (I think the only component I had need to buy from the electronics store was a thermistor). Because of this you may see examples of where the component count is higher than it need be, such as using three transformers to get 50VAC when one would have done. My philosophy – why spend $50 (or more) when I can find a way to do the job for nothing out of the component junk-box.

Photo 1: LF Transmitter — RF Unit and VFO

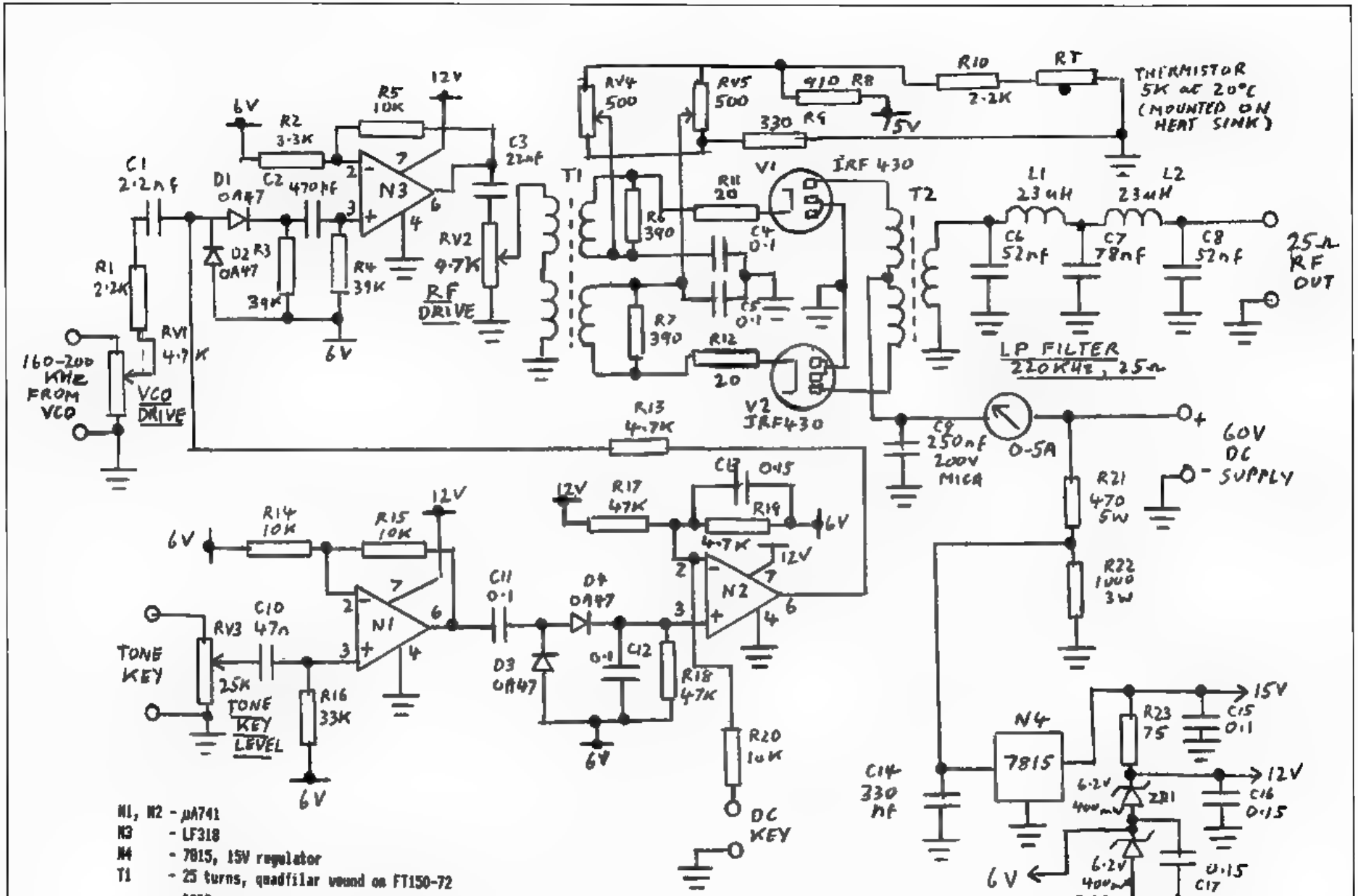
The RF Circuit

The circuit of the RF Power Amplifier, RF Driver and keyer system is shown in figure 1.

The RF Power Amplifier uses a pair of HEXFET IRF430 transistors (V1,V2) operating in a linear mode, push-pull class B. The design of the circuit is based on one which I had previously submitted and which was published in Amateur Radio, November 1989 (ref 2). For more detail on the characteristics of the HEXFET transistors and the circuit design, I refer you to that article.

Using the output transformer as shown, the amplifier can deliver 70 Watts into 20 Ohms (or 100 Watts into 18 Ohms) with an efficiency around 60%. (The remaining 40% is of course heating of the transistors). The transistors are mounted on 6 inches

continued on page 25



N1, N2 - µA741
N3 - LF318
N4 - 7815, 15V regulator
T1 - 25 turns, quadfilar wound on FT150-72 core
T2 - 22 turns trifilar wound on 628-55254 iron dust core (4mm, AL = 175mH/1000T)
L1, L2 - 26 turns on FC334 T130-3 core

FIGURE 1

LF TRANSMITTER

KEYER CIRCUIT, RF DRIVER & POWER AMPLIFIER CIRCUITS

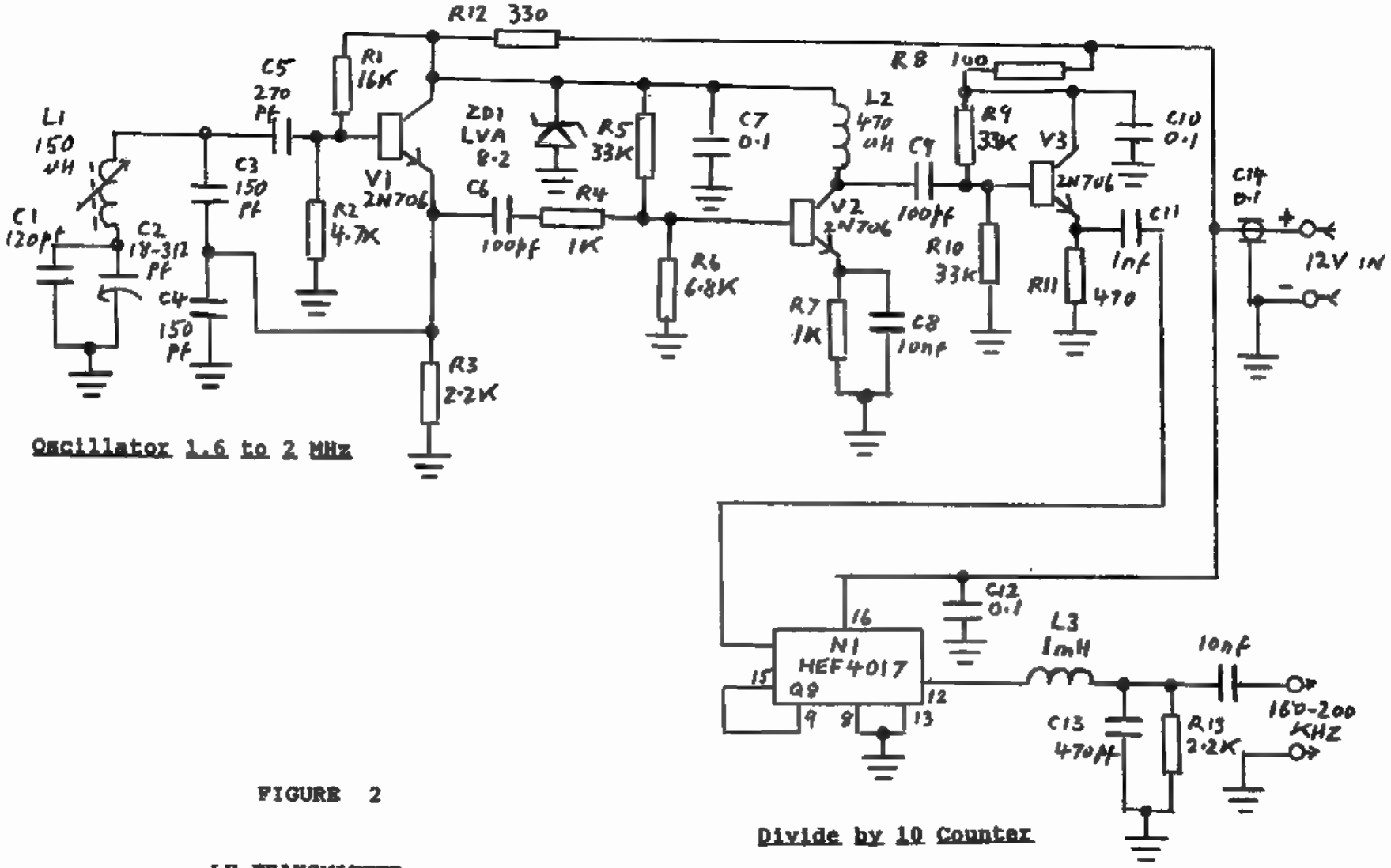
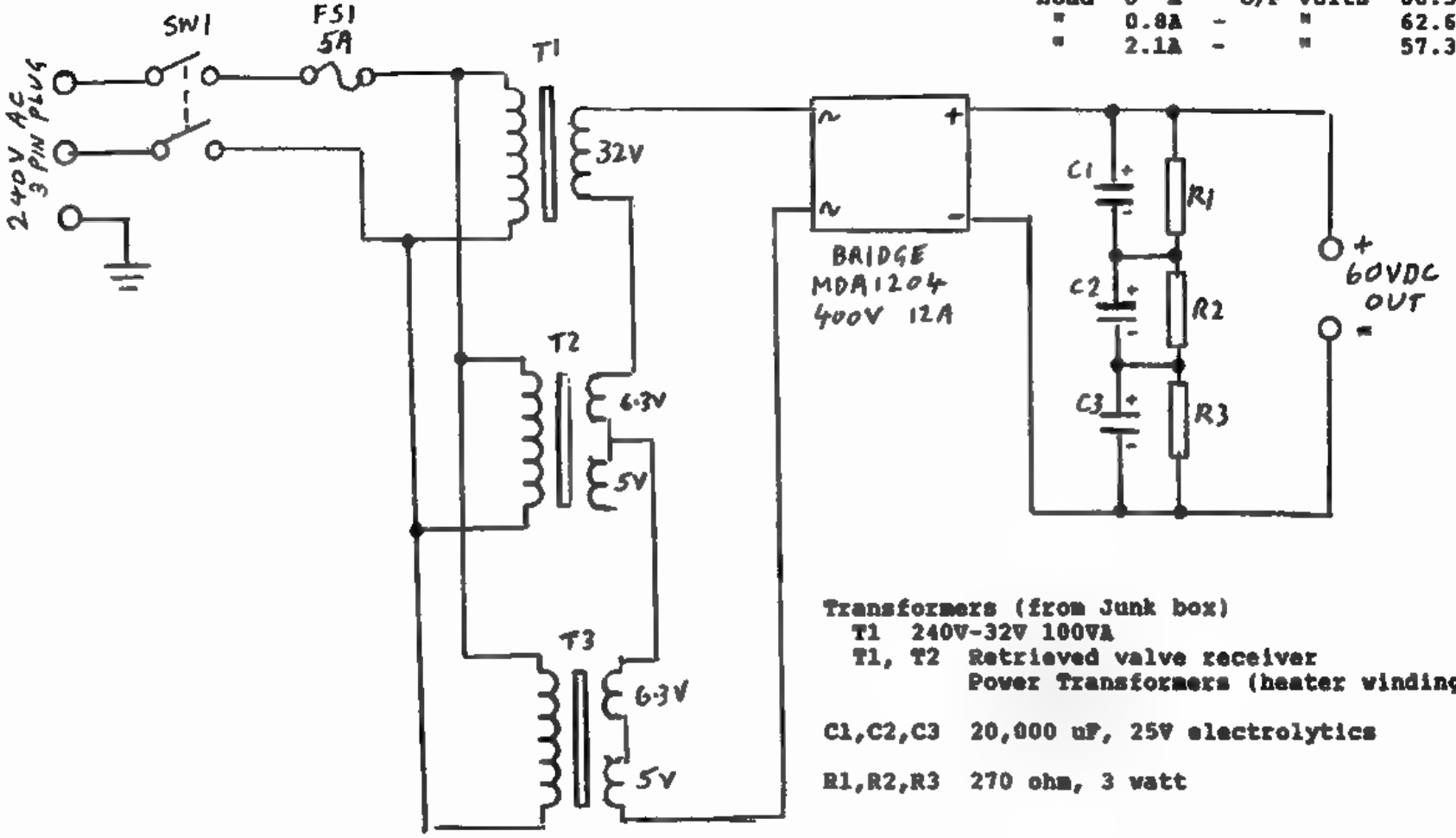


FIGURE 2

LF TRANSMITTER

160 - 200 kHz VARIABLE FREQUENCY OSCILLATOR (VFO)



Regulation Tests

Load	0 A	- O/P Volts		66.5V
"	0.8A	-	"	62.6V
"	2.1A	-	"	57.3A

Transformers (from Junk box)

T1 240V-32V 100VA

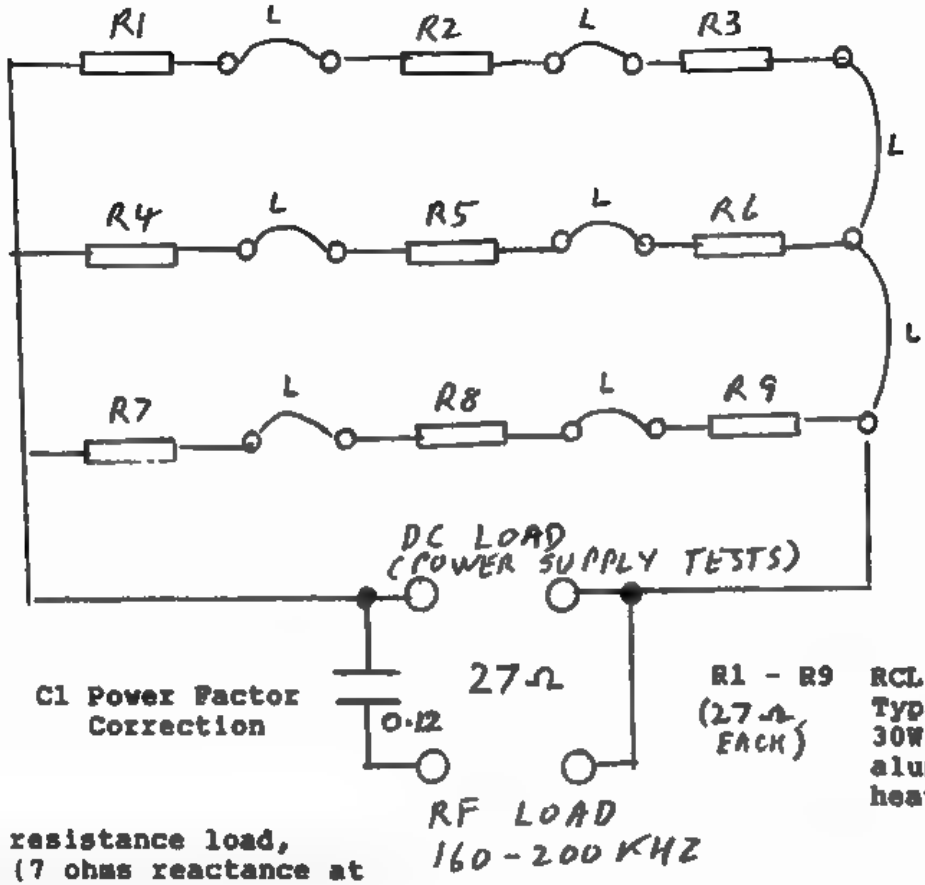
T1, T2 Retrieved valve receiver Power Transformers (heater windings used)

C1,C2,C3 20,000 uF, 25V electrolytics

R1,R2,R3 270 ohm, 3 watt

FIGURE 3 [redacted]

60 VOLT 3 AMP POWER SUPPLY



L = Links to alter load if required

R1 - R9 (27Ω EACH) RCL Aluminium Housed Beryllium Type ALB50 Rating 50W at 25C & 30W at 125C (Mounted on 3mm thick aluminium sheet 400mm x 230mm as heat sink)

Connected as 27 ohm resistance load, inductance is 6µH. (7 ohms reactance at 180kHz - corrected by 0.12µF capacitor)

FIGURE 4

LF TRANSMITTER

DUMMY POWER LOAD RESISTANCE (DC & RF)

continued from page 20

(150mm) of Minifin heatsink via beryllium insulating washers. With natural convection, the thermal resistance of the Minifin is around 1 degree Celsius per Watt and the washers 0.1 degrees Celsius per Watt. As such, the temperature rise at the transistor case could be around 56 degrees for an anticipated heat dissipation of up to 40 Watts (continuous signal). This should hold the transistors within their temperature tolerance, but just to make sure, I bolted some extra aluminium fin material to the two sides of the Minifin. In practice operating at 70 Watts of continuous output, the transistors run at quite a moderate temperature as felt by the hand. (Of course, in keyer operation the average output power and heat dissipation is even much less).

Static drain current (no signal) is set to 150 mA per transistor (300 mA total) with trim pots RV4 and RV5 which control the forward bias voltage). Thermistor R1 is mounted in direct thermal contact with the heat sink and connected in the gate bias circuit. This reduces bias as the temperature rises to hold static drain current reasonably constant with temperature rise the need for this was explained in Reference 2. As full power of 70 Watts loaded into 25 Ohms, total drain current rises to around 2 Amperes.

The RF output is fed via a 5th order Chebychev 220 kHz low pass filter designed for the 25 Ohm load. Theoretical attenuation at the first octave in this type of filter is in the order of 55 dB and harmonic radiation could be expected to be more than 70 dB below carrier level.

The nominal drain supply for the output transistors is 60 volts DC. This is dropped down to 15V via regulator N4 for the gate bias supply. The 15V in further reduced, using zener diodes ZD1 and ZD2, to provide 12V and 6V supply liner for the RF driver and keyer stages: N3, N1 and N2. The 12V is also fed out to the VFO which is built in a separate shielded box to that containing the transmitter, driver and keying circuits.

Carrier on/off for keying in controller by the gates D1 and D2. For gate closed, D1 is reverse biased and D2 conducts to loop the RF line from the VFO. For gate open, D2 is reverse biased and open and D1 conducts to connect the VFO to the input of stage N3. Stage N2 provides the switching voltage in turn controller either by opening on closing the DC key line of keyer tone. The DC keying is applied via the inverting input of N2. Keyed tone is fed via stage N1 to rectifier circuit D3 and D4 which develops a DC voltage to control N2 output via its non inverting input.

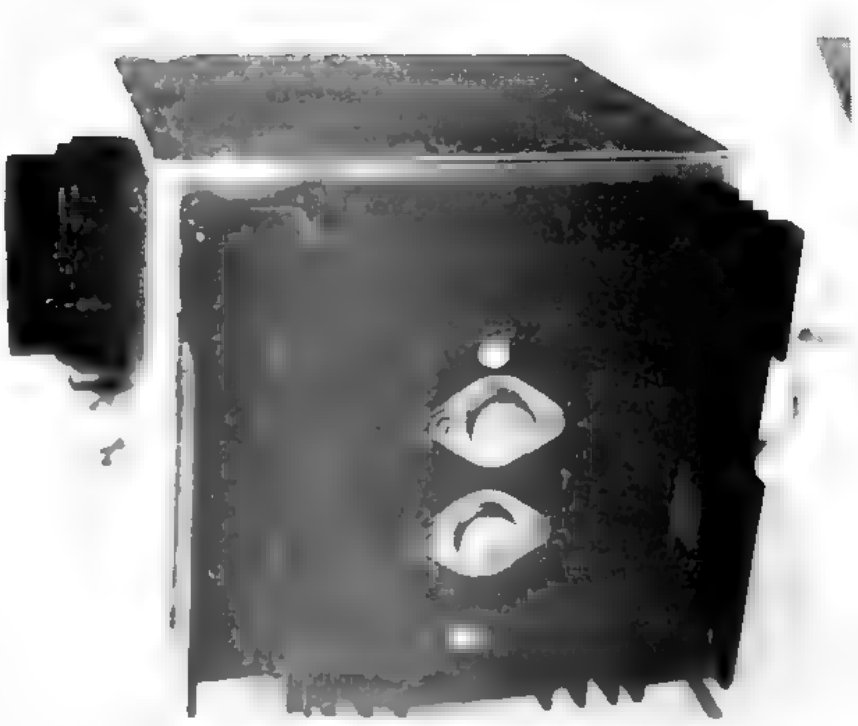


Photo 2: LF Transmitter
Rexfet Power Transistors mounted on heat sink

The Variable Frequency Oscillator (VFO)

The VFO provides output tunable between the range of 160 to 200 kHz. The circuit diagram is shown in figure 2. The tunable oscillator V1 operates at 10 times the base band frequency (ie 1.6 to 2 MHz) rather than at the base band frequency itself of 160 to 200 kHz. The 10 times arrangement is done for two reasons:-

(1) It is more convenient to provide a small tuning capacitor to cover the range of 1.6 to 2 MHz than is the larger variable capacitor needed to tune the LF band.

(2) By operating the VFO at a remotely different frequency, there is less chance of any instability problem due to feedback from the high power output of the transmitter into the VFO.

The card containing the variable oscillator V1 and buffer stages (V2 &V3) was already assembled as I had used that card for several projects before. I simply had to adjust the tuning range, calibrate the dial and add the divide by 10 stage N1. Frequency selection is controlled by variable capacitor C2 which is coupled to a vernier drive dial.

The output of N2 is a square wave and this is shaped to sine wave form by filter L2-C13. Output voltage from the filter approached 15Vpp. This is too high for the input of the keying gate and RF driver and its level is reduced by potentiometer RV1 (Fig 1)

60V Power Supply

The circuit of the 60 Volt power supply is shown in figure 3. This is a simple unregulated supply using a transformed secondary voltage of about 50. The output is rectified by a bridge package and filtered by a large parallel capacitor.

I didn't have quite the right transformer, so I used a heavy duty 30 volt transformer which I did have and built up the voltage to 50 by series connection of the heater filament supply secondaries of two retrieved valve power supply transformers.

Another item I did not have was a very large capacitor with a voltage rating exceeding the peak DC output voltage. I did have some 20,000 µF electrolytic capacitors rated at 25V so I connected three of these in series to provide 6700 µF at 75V The three power transformers and three large capacitors made up a lot of bulk and weight and the whole supply was mounted on a discarded valve receiver chassis which had been stripped of previous components.

With this simple type of power supply, there is quite a bit of voltage swing between the key up and key down states. For the proposed CW operation this is of little concern. On the other hand, if the transmitter were to be used in an SSB mode, some compression of the modulated signal

continued next page

continued from previous page

could be expected at the signal envelope increases in amplitude with speech lever upward swing. For this mode, improved regulation in the power supply might be desirable.

The Dummy Load

Having selected 20 Ohms as the operational load, a dummy load close to 20 Ohms was needed for test purposes. Fortunately, at LF it is possible to use some types of power resistor which would otherwise would be unsuitable for higher frequencies because of their inductance and distributed capacity. I made up a load using nine 27 Ohm aluminium housed beryllium resistors in a series/parallel connection and mounted them on an aluminium sheet, 420mm by 230mm by 3mm thick, for a heat sink. The arrangement, shown in figure 4, can dissipate 300 to 400 Watts depending on resistor case temperature. With 70 Watts of power from the transmitter, there is barely a temperature rise.

Load resistance values other than 27 Ohms are arranged by altering connection links between the individual resistors. The inductance in series with 27 Ohms resistance is close to 6µH which represents only 7 Ohms reactance at 180 kHz. This reactance is essentially cancelled by the power factor correcting capacitor of 0.12µF in series.

Apart from its function as a RF test load, the dummy load (without series capacitor) was also put to use to carry out DC load tests on the power supply.

Transmission Line and Antenna Matching

As these low frequencies, unless one has a large canyon to hand and antenna, the effective antenna length is very much smaller than a quarter wavelength. Hence, radiation resistance is very low (often somewhat less than an Ohm) and the antenna must be loaded with quite a large inductor which inherently has loss resistance quite high compared to the value of radiation resistance. Added to this is the installation earth loss resistance. All in all, unless the antenna is of massive proportions, most of the power delivered is consumed as loss in the inductor and loss in the earth system.

My initial thoughts were that we would be unlikely to get a total Load resistance (radiation plus loss) below 25 Ohms. That is the reason I selected 25 Ohms for the load circuit of the transmitter, expecting to feed the antenna directly from the transmitter.

Further to that, Harry was able to provide a big inductor coil which could be adjusted up to 1.2 mH and had a Q of around 300. I figured from measurements and some calculation that, at mid band frequency (180 kHz), his vertical tower would have a radiation resistance of around 0.5 Ohm and a capacitance of around 850pF. I decided that, loaded with his inductor, we would have a loss resistance in the inductor of 3.5 Ohms and I made a guess that his extensive earth system would have a loss resistance within one Ohm. Hence, our total load would look like a resistance of 5 Ohms and radiation efficiency would be 10% (For 70 watts of transmitter power we would radiate 7 watts).

Rather than operate the transmitter right at the antenna, it was decided that it would be more convenient to locate the transmitter in Harry's radio shack (the old VIA control room) and feed the antenna via a 225 metre length of 75 Ohm coax already in place to the antenna. (At these frequencies, power loss in the coax would be small). A proposal for the system is shown in figure 5. The transmitter would be coupled to the coax via a 25/75 Ohm transformer mounted at the transmitter. An L match at the antenna would match the coax to the antenna low resistance circuit. A shunt capacitor of around 43 nano Farad would be needed and the 1.2 mH coil would be adjusted to provide the series reactance for the L match plus the inductive reactance to load the antenna (ie. to cancel its capacitive reactive component).

Well, the operational installation has never been put into practice but we did formulate the plan. Also considered was the possibility of transmitting from my home. However, with the limited antenna I could provide, radiation resistance would be a mere fraction of an Ohm and radiated power would be but a fraction of a Watt.

RF Capacitors

One problem I encountered with this project was finding suitable capacitors to operate at high power in the RF transmission circuit. At these low frequencies, capacitance values are quite high and not only do they have to withstand the peak RF voltage, they also have to pass quite high reactive current. As I explained in a previous article (*Amateur Radio* January 1995, ref 3), RF current through loss resistance in the capacitor causes heating (ie. power lost) and if heating is excessive it can damage the capacitor.

For the three LP filter capacitors C6, C7 & C8 in figure 1, the best I could do was to make up the required values with 600V polyester tubular capacitors. At nominal values of 52 and 78, nano Farads, peak current for 70 Watts output is in the order of 4 to 4 Amperes. These capacitors were hardly designed to stand this sort of treatment and it is not surprising that, in a sustained carrier condition, they run warm. It is a worry that they might not withstand prolonged operation and I would like to replace them with more suitable mica or high power disc ceramics.

Another problem capacitor is the 42 nano Farad one proposed as part of the L matching network (figure 5). A suitable type of capacitor with high current rating would also have been needed for this application.

A third capacitor to mention is bypass capacitor C9 as the centre of T2 in figure 1. This point is virtually RF cold but the capacitor does have to conduct any out of balance current between V1 & V2. For this job, I had a nice 250 nano Farad 200V mica available.

Summary

Described is an LF transmitter assembled essentially from components accumulated in the amateur radio shack. Also described are details of a plan we had to use the transmitter to send out test signals from the old Coastal Radio Site VIA (Now the home and amateur radio station of Harry VK5HK).

In its present form, the transmitter can operate within the range of 160 to 200 kHz at a power of 70 Watts keyed in a CW mode) At the time of writing, we wait the success of the WIA in seeking a LF band segment for licensed amateurs. If they do succeed and the approved band is outside this transmitter frequency range (say 138 kHz as in UK rather than 160-190 as in NZ) then I will have to change the VFO frequency range and the cut-off frequency of the LP filter at the output.

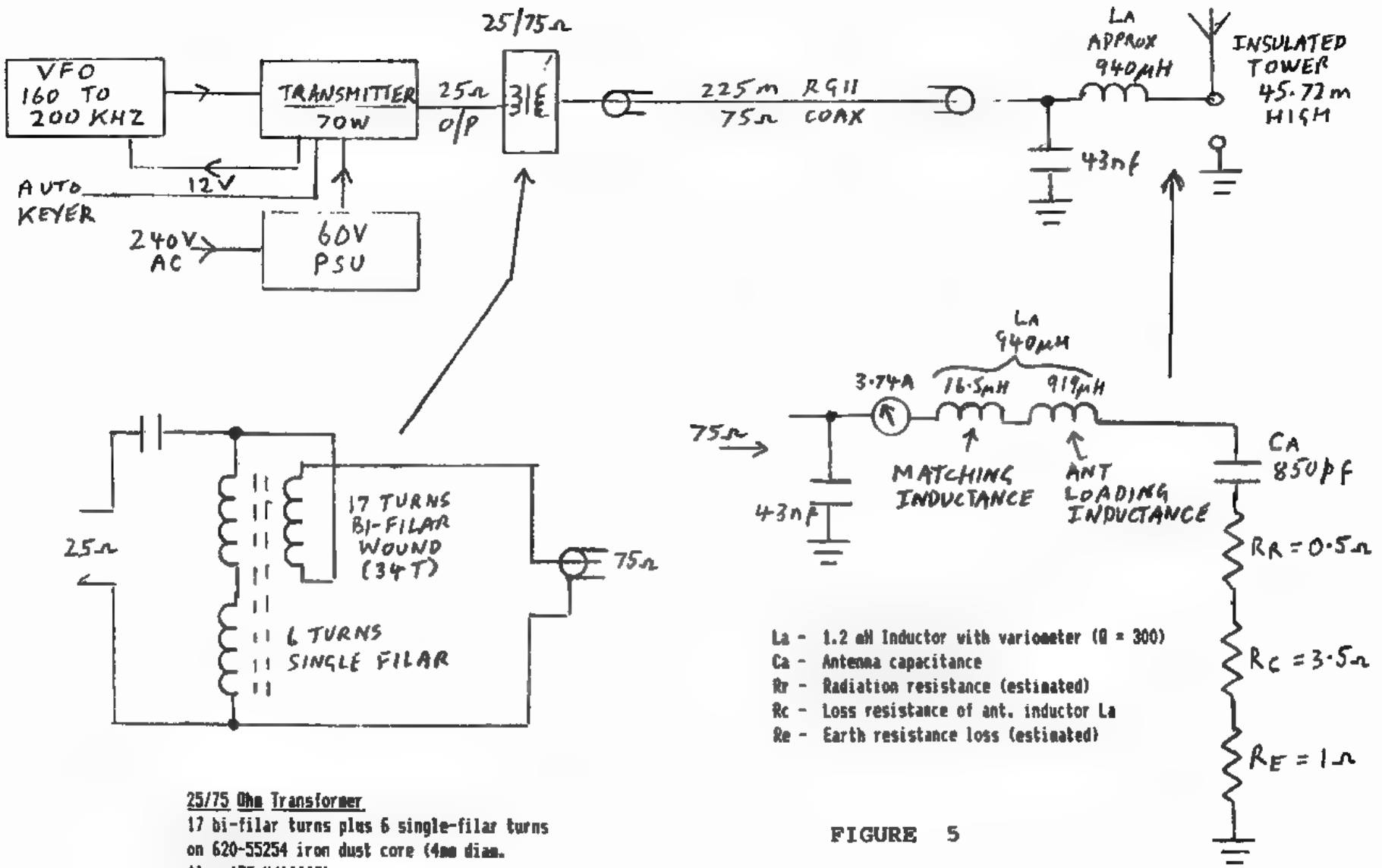
I guess every frequency band offers its own design problems. As LF it is not lead length or stray capacitance but more about larger inductors and finding suitable capacitors. Above all it is about how to radiate some useful power from an antenna limited in size compared to a wavelength. Also to get on the air below 200 kHz, it is a case of either build a special transmitter or modify one made for higher frequencies. So it's home-brew just like the good old days!

References

1 Lloyd Butler VK5BR – A LF Antenna Bridge – *Amateur Radio*, October 1998

2 Lloyd Butler VK5BR – RF Power Linear Amplification using the IRF MOSFET – *Amateur Radio* November 1989

3 Lloyd Butler VK5BR – Capacitors at High RF Power *Amateur Radio* January 1995



La - 1.2 mH Inductor with variometer (Q = 300)
Ca - Antenna capacitance
Rr - Radiation resistance (estimated)
Rc - Loss resistance of ant. inductor La
Re - Earth resistance loss (estimated)

25/75 Ohm Transformer
17 bi-filar turns plus 6 single-filar turns
on 620-55254 iron dust core (4mm diam.
Al = 175mH/1000T)

FIGURE 5

LF TRANSMITTER

PROPOSED ARRANGEMENT TO FEED & LOAD VERTICAL ANTENNA TOWER

DON'T MISS THE ACTION!

VX-5R 6m/2m/70cm Deluxe Hand-Held

Tiny yet incredibly rugged, the VX-5R provides 6m, 2m and 70cm amateur band operation with 5W output as standard (4.5W on 70cm), made possible by a unique PA design and a super high capacity 7.2v 1100mA/H Lithium-ion battery. Plus, ultra-wide coverage VHF and UHF as well as AM medium-wave and shortwave reception facilities are provided, along with a large backlit dot-matrix LCD screen. All this in a diecast aluminium enclosure just 58 x 87 x 28mm WHD (w/o knobs or antenna)!

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The Yaesu FT-50RD is an amazingly compact 2m/70cm amateur band handheld transceiver which provides MIL-STD 810 shock and vibration resistance, super wideband receiver coverage, simple menu settings for most functions, and compatibility with the optional Yaesu ADMS-1E software/interface package for PC programming of many functions.

Other features include:

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- FTT-12 keypad provides Digital Voice Recording, CTCSS/DCS scanning, and CTCSS encode/decode
- 2m/70cm RF output: 2.5, 1.0, 0.1W standard, up to 5W with 9.6V battery or 12V DC socket
- "Omni-glow" LCD screen for easier night-time viewing
- 112 memory channels with 4 character alpha naming
- Dual watch allows monitoring of sub-band activity
- Direct FM modulation for better audio quality
- 5 battery saving systems (includes Rx and Tx Save)
- Comes with FNB-40 slimline 6V 650mA/H Nicad battery pack, flexible 2m/70cm antenna and modified M-9626 AC plugpack adaptor for Nicad charging

D 3660

YAESU

$499

SAVE $70

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Yaesu FT-90R 2m/70cm micro mobile

Another engineering breakthrough from Yaesu - a tiny dual-band mobile rig with high power output, a remoteable front panel, and a rugged receiver front-end.

The FT-90R provides 50W RF output on the 2m band as well as 35W output on the 70cm band, a solid diecast casing with microprocessor controlled cooling fan for reliable operation, and a large back-lit LCD screen, all in a package measuring just 100mm x 30mm x 138mm.

Also includes:

- Wide dynamic range receiver for reduced pager breakthrough
- Huge receiver coverage – 100-230, 300-530, 810-999 975MHz (Cellular blocked)
- 180 memories and a variety of scanning functions
- Built-in CTCSS encode/decode, battery voltage metering
- Designed for 1200 and 9600 baud Packet operation
- Tiny remoteable front panel (requires optional YSK-90 separation kit)

Includes MH-42 hand mic, DC power lead, and easy to follow instructions.

D 33 7

YAESU

$899

2 YEAR WARRANTY

YSK-90 Front Panel Separation Kit D 3317 **$129.95**

FOR ALL YOUR COMMUNICATION NEEDS

6m 1/2 Wave Base Antenna

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D 4825

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Also includes:

- 31 tuneable memories
- 7 selectable tuning steps
- Various scanning modes
- In-built CTCSS encoder
- MH-26 hand mic, mobile mounting bracket & DC power lead

Specifications:

Frequency range:	Tx 144-148MHz, Rx 140-174MHz
Output power:	50W, 25W, 5W
Sensitivity:	better than 0.2uV for 12dB SINAD
Image rejection:	better than 70dB
Max audio output:	2.0W into 8 ohms (10% THD)
Dimensions :	160 x 50 x 180mm (W.H.D)

D 3632

YAESU

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LOW PRICE

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B 2344

NEW $17.95

ARRL Handbook

77th edition of this famous publication. Incredibly wide range of information for operators and constructors

B 2237

NEW $59.95

Yaesu FT-840 HF Mobile

An ideal first rig for home or vehicle use, the economical Yaesu FT-840 covers all HF bands from 160-10m with 100W PEP output, and provides continuous receiver coverage from 100kHz to 30MHz.

The FT-840 provides:

- SSB/CW/AM operation (FM optional)
- 100 memory channels, two independent VFOs per band
- Large back-lit LCD screen, uncluttered front panel
- Effective noise blanker
- Variable mic gain and RF power controls
- SSB speech processor for greater audio punch
- IF Shift & CW Reverse to fight interference
- Dual Direct Digital Synthesisers for cleaner TX/RX operation
- Compact case size of just 238 x 93 x 243mm (W.H.D.)

D 3275

YAESU $1675

FM module suit FT-840 D 2932 $109.95

2 YEAR WARRANTY

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Talking Radio

Highlights of the WIA/ACA Liaison meeting

The WIA met with the Australian Communications Authority in December 1999. Representing the WIA/ACA-Liaison Committee were Peter Naish, WIA Federal President and Committee Chairman; Wally Howse, WIA Director; Michael Corbin, WIA NSW State President; Glenn Dunstan, WIA Councillor for ACT; and Richard Jenkins, WIA Canberra liaison officer.

Issues discussed:

Olympic Games - possible use of Amateur 6cm band

The Sydney Olympic Broadcasting Organisation (SOBO) proposes to circle a plane over Sydney to act as a backup method of communications. Technical details yet to be specified; it is expected to be a 5 watt service radiating from the undercarriage of the aircraft.

There are concerns from overseas associates. North America and Europe particularly, that this proposal could compromise the amateur satellite service, with the expected launch of an amateur satellite in the second quarter of 2000.

The WIA suggested that SOBO use part of the band away from the amateur satellite service. The ACA agreed that this was a good suggestion and it was what SOBO intended at this time.

Status report on 80 metre DX Window progress

Glenn Dunstan will coordinate a small team of WIA members to progress this matter and liaise with the ACA and users around the 80m DX window.

There are now mechanisms in place preventing any new assignments being made in the band An implementation plan has been endorsed by the Radiocommunications Steering Committee (RSC) The ACA to approach users during January/February 2000, and inform them of the decision; the WIA will in turn shall contact users with their own follow up letter.

Discussion on the provision of more primary spectrum allocations for the amateur radio service to compensate for spectrum losses elsewhere. Desire by the WIA to gain access nationally to the full six-metre band of 50 - 54 MHz.

The WIA sought permanent allocation of the 50-54 MHz band if and when the ABA return the spectrum to radiocommunications. Currently Amateurs are secondary to broadcasting from 50-52MHz,and primary in the 52-54MHz segment. Other allocations may be lost to other users, namely 2.3 GHz to pay-TV and 3.5 GHz to spectrum auction. The WIA is pushing for primary allocations within the microwave bands to compensate for previous losses.

The ACA commented that secondary allocations should be viewed as an extra opportunity and not viewed as lost primary allocation. Over the last few decades it has been noted that amateurs have done a lot of work within secondary allocations but focus should remain on primary allocations for mainstream activities. Any future allocations would need to be in line with Region 3. The future of broadcasting in the 50-52 MHz segment is unknown at this stage.

WIA request for a review of licensing arrangements in the LF Band

It is still the ACA's intent to progress this to more reflect amateur usage of this band. It is hoped that an amateur callsign may be allocated to a Scientific licence, however it is unsure how much work this will entail or whether current structures can accommodate this. The issue of bandwidth of operation will also be looked at.

The Radiocommunication Licensing Policy Team (RLPT) will update the WIA during first quarter of 2000.

EME Permits, "inconsistency" clause required

Amendments to Licence Conditions Determination (LCD) for amateur licences will include a generic condition that will be applied to all licences. This condition will allow the ACA to vary an amateur's licence by special condition to give more power. The inconsistency clause allows a special condition to be written that is inconsistent with the LCD. The special condition will override conditions in the LCD to accommodate high power Earth Moon Earth requests Other criteria may still apply to each request with Wally Howse (WIA) asking for EMR issues to be addressed rather than elevation.

This revised LCD is currently with ACA Legal and is expected to be presented to ACA Authority for final approval at their first meeting for 2000, expected mid-January. Once approval has been given, this change will be gazetted the following week.

Examinations - reply to WIA's request for a firm date for the introduction of the proposed revised examination arrangements and ACA commitment for an extension of present arrangement to enable adequate financial and resource budgeting by WIA.

There is a possibility of one organisation being able to conduct both amateur and marine exams, however they must have the necessary skills to provide this service.

The ACA would like organisations to run the exams in their own right and issue the certificates of proficiency. Allowing competition is part of the ACA's principle, but the low volume of exams is an important factor While it is recognised that there may be some problems with this approach it does warrant further investigation.

The WIA asked for a firm commitment to continue the current arrangements until 31 December 2000. Such a commitment would allow the ACA to include in its tendering process, an indication that the successful tenderer would take over responsibility for exams from 1 January 2001. The ACA undertook to consider this.

WIA examination invigilators

The WIA is looking at rationalising the somewhat outdated list of invigilators; there appears to be quite a number of invigilators who have not conducted an exam for quite some time and are now clearly not available. The current objective of the WIA is to terminate the appointment of all invigilators and seek nominations for new invigilators. The WIA will set criteria for their invigilators in an attempt to improve the service for the people sitting the exams, the WIA and the ACA.

Review of licence fee schedule and a five year licence

During the last WIA/ACA meeting it was recorded that "the renewal administrative charge was now $19 not $20 per transmitter". This was incorrect as the renewal fee is only $9. Where a licensee elects to pay up front for a multi-year amateur licence, the amount payable will be the unrounded annual licence fee multiplied by the term of the licence, less a discount on the administrative component. The discount will be $9 or the total administrative component of the licence fee (whichever is lower) for each annual renewal that would have been made over the period of the licence. Ie one year = $50, 2 years = $91, 3 years = $132, 4 years = $173, 5 years = $214. This was confirmed in copies of page 47 of the Apparatus Licence Fee Schedule which were handed to meeting attendees.

The WIA asked what impact the Goods and Services Tax (GST) would have on licence fees. It is unknown at this stage what the effect will be and the ACA will inform the WIA of the decision when it comes to hand

ACA review of the principle of a HF Gateway facility.

Initial approaches have raised a concern of unqualified amateurs accessing bands not applicable to their licence class. Linking VHF/UHF repeaters is known to be successful with few if any breaches of requirements. The meeting agreed that the licensee of such a service would probably need to be a repeater group rather than an individual. With advanced technology now available, the ACA will now reconsider this issue.

Reservation of callsign suffix group WIA-WIZ for special purposes including Wireless Institute Civil Emergency Network (WICEN).

The callsigns WIA-WIZ are reserved for use by the WIA, including WICEN. Anyone who wishes to operate a device under such a callsign should apply for a licence.

A licensee under section 117 of the *Radiocommunications Act 1992*, may by written instrument authorise other persons to operate a radiocommunications device under the licence. However, any licensee who authorises another person must keep a copy of the authorisation in Australia; and retain the copy for at least one year after the authorisation ceases to be in force.

A licensee may apply for exemption from licence fees. Exemptions are made under regulation 5 of the *Radiocommunications Taxes Collection Regulations* and under the *Radiocommunications (Charges) Determination No. 1 of 1997* and any application should meet the criteria set out in these.

In summary,

- The callsign suffixes WIA-WIZ are reserved by the ACA for issue to the WIA;
- WIA or WICEN may apply to use these callsigns;
- Records must be kept in relation to third party operations;
- Eligible applicants may be granted fee exemption if they meet the criteria.

Linked repeaters, removal of restrictions on in-band linking

The ACA advised that there is an obsolete reference in the Amateur Licence Information Paper that only three amateur repeaters may be cross-linked. This reference is superseded by the Amateur LCD where there are no requirements on in band linking. The ACA will remove the reference from the Amateur Licence Information Paper.

Amateur use of Channel 35

The ACA received advice from the ABA that the drop through for amateur TV services has been extended in four of the five locations, O'Halloran Hill (SA), Springwood (NSW), Spring Hill (QLD) and Lane Cove (NSW), until 31 December 2000. The only exception is Olinda (VIC) which is required for use by digital services in Melbourne under the ABA's Digital Channel Plan (DCP) for Victoria.

Correspondence received from amateur concerning WIA lack of consultation

The ACA received correspondence from an amateur who is concerned about a perceived lack of consultation by the WIA on matters such as the 80m DX window and the LF band. The WIA had consulted with the members that used the 80m DX window on a daily basis who would be considered as experts in this area, and they were happy that the WIA wished to align with the European band plan. The WIA had included references to its proposals on the 80m DX window through its News Broadcasts and on its Federal Web page so that all members could comment in addition to the keen operators in this band.

Internet Linking of Repeaters

Peter Naish asked for the ACA's view on a trial program set up by the UK's Radiocommunications Agency allowing for amateur repeaters to be linked via the Internet. Current policy does not allow for such an application. Mutual concern that unqualified people could get access to repeaters not just in Australia but overseas. The concerns are similar to those raised for HF gateways.

Use of Morse Code

The WIA raised an information point that there is an increasing body of WIA members and radio enthusiasts in general who are debating the need for qualification to send and receive Morse code in order to obtain a HF Amateur licence. Resulting from that increasing interest among WIA members, the WIA, through its State Divisions, was conducting a survey on Morse code to come up with a concise view on what the Australian radio amateur wishes to do about the matter. The WIA is happy to provide the ACA with the results of this survey.

The ACA responded that it expected that the issue will be addressed at WARC 2003 The ACA, although receiving a number of form letters requesting changes to the requirements for Morse code, does not propose any unilateral changes. The existing arrangements are the basis for a number of reciprocal agreements. The ACA would like to see amateurs worldwide put forward a consolidated position on Morse code which can be resolved at WARC 2003.

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TECHNICAL ABSTRACTS

Gil Sones VK3AUI
30 Moore Street, Box Hill South Vic 3128

New Finals for FT101

The FT101 series of transceivers from Yaesu were very popular but the price of replacement final valves has risen as the market for valves has shrunk. Most of the FT101 series used 6JS6 series valves intended for TV horizontal deflection service. These were a cheap alternative but have now risen in price as the TV replacement market has all but disappeared. Also the originals were usually from a small group of manufacturers whose products had been found empirically to be good for RF service. The supply nowadays may require some expensive experimentation for RF service as the internal structure of the valves may differ. They may work in a TV set but may be less successful in a transceiver.

Other manufacturers used the 6146B and its variants which were designed for RF service. Over the time since manufacture of thre transceiver these valves whilst expensive have not risen dramatically in price. Being characterised for RF service they can be sourced from alternative suppliers. There have been articles in magazines describing how to substitute 6146's for 6JS6's in an FT101. The original article appeared in Radio ZS August 1998 and then in QST May 1999 with an update in QST September 1999. The article was the work of Roger Davis ZS1J and the QST articles were reprints in the Hints and Kinks column of Bob Schetgen KU7G.

Also in the article a common fault with the FT101 series was mentioned which should be attended to regardless of the finals used. The 80 pF capacitor between the grids of the final valves and the driver tube plate (12BY7A) which is C13 has been known to break down in a number of cases leading to the destruction of the final valves. The replacement of the capacitor is recommended but if a replacement is impossible to obtain the finals can be protected by placing an 0.01 mF HV disc in series. This will prevent the application of positive voltage on the grids which can lead to the demise of the valves and in some cases the demise of the power supply

The modification is shown in Fig 1. To commence unsolder the components and wiring to the 12 pin sockets used by the 6JS6's. This means the components R14(100 Ohm), L4/R9, C16, R12, the blue heater wire, and the inner of the black coax, and also the decoupling capacitors. The 12 pin sockets should then be removed and replaced with 8 pin octal sockets. The keyway of the octal should face to the chassis centre as shown in Fig 1A. Wire the sockets according to Fig 1A.

The decoupling capacitors which have been left off the pictorial for clarity should be connected between the points marked with an asterisk and the nearest convenient chassis grounding point. They are shown on the circuit in Fig 1B.

The 6146 type requires a different screen voltage to the 6JS6 and so the orange wire between R14 and C35 (a feedthrough) needs to be moved to a different feedthrough capacitor C30. This is the 300 Volt line for the 12BY7A driver You may need to adjust the 6146 screen voltage further with a series zener diode as this nominal voltage does appear too high but this was not mentioned in the original article.

In the original article the neutralising was modified by replacing C125 (100 pF) with a 2 pF capacitor. C125 is connected between the top of the plate choke and the variable neutralsing capacitor. However in the latest article an alternative and superior modification to the neutralising circuit was given. The improved modification was to leave C125 untouched and to connect an additional 2000 pF 1KV capacitor across C11 the 200 pF bypass capacitor for the cold

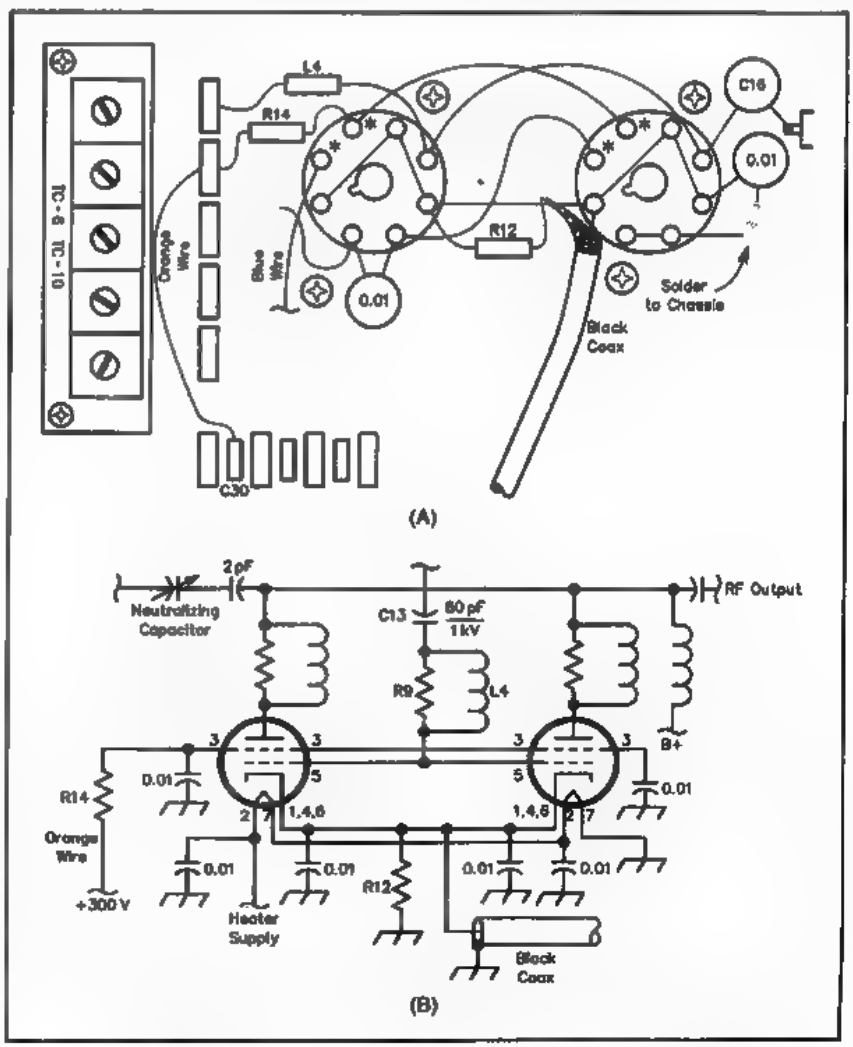

Fig 1 (A) Pictorial of FT101 PA wiring. (B) FT101 Final schematic. * indicates 0.01 mF decoupling connection point.

end of the 12BY7 plate tuned circuit. This not only modifies the neutralising but also by improving bypassing of the driver tuned circuit provides greater drive.

To compensate for the different grid capacitance of the new finals a 20 pF trimmer should be connected across T103. The trimmer board with trimmer capacitors TC6 to TC10 will need to be temporarily moved aside to fit and adjust this trimmer.

Before testing the final bias supply pot should be adjusted fully counter clockwise. This is on board PB-1314. This should be adjusted for 60 mA plate current in SSB mode with no audio.

The trimmer capacitor across T103 is adjusted with the other trimmer board temporarily moved aside. The preselector should be set to the beginning of the 28 MHz mark and the trimmer adjusted for maximum drive. The trimmer board may then be fastened back in position. The trimmers should be treated with caution during this adjustment as they have high voltage on them. The alignment should be checked as detailed in the handbook and the neutralisation adjustment made as per the handbook. There may be some interaction between the adjustment of the new trimmer and the handbook alignment but it should be minimal. The neutralisation should proceed normally and should be a simple procedure

PTT Sound

There are many programs available to allow you to run modes such as CW, RTTY, AMTOR, PACTOR, PSK31, SSTV, FAX, Hellschreiber etc using the sound card in a PC.

One source of such programs on the internet is http://www.muenster.de/~welp/sb.htm. A suitable interface card between the computer and the transceiver appeared in QST November 1999. The article by Salvador Esteban EB3NC had originally appeared in CQ Radio Amateur Spanish Edition August 1998. While you may be able to get away without an interface card it does make operation somewhat simpler.

The card called PTT Sound interfaces the computer serial port and sound card input and output to the transceiver. Levels can be set on the card and microphone input is provided for with a push to talk switch. The card is designed to allow the use of an electret microphone.

The PTT Sound card circuit is shown in Fig 2. The components are relatively non critical. Transistor Q1 could be any low noise NPN audio type. The ECG series are just a series of replacement parts which may be available locally but there are many other local types which would be suitable.

The various input and output levels can be set on the interface card. The jumper J1 can be set for the required PTT input from the computer serial port. This may vary with the software selected. The audio input from the sound card can come from either the left or right channel. The author used the tip or left channel.

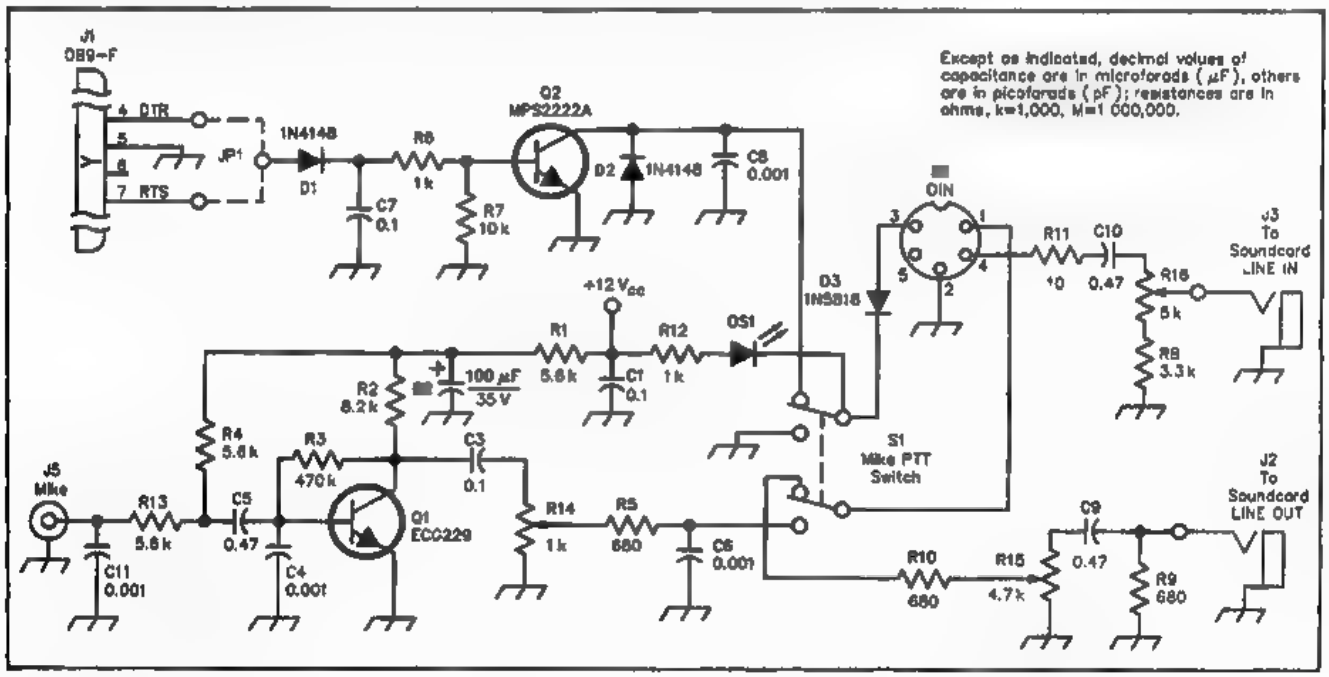

Fig 2. PTT Sound Interface Card.

Erratum

An error occurred in the January 2000 Technical Abstracts which saw the omission of Fig 1. This showed the setup of the original loop described by K Patterson in Electronics Aug 21 1967 and the setup of the AMA loop of Chris Käferlein DK5CZ and Hans Würtz DL2FA originally published in CQ DL Feb and April 1983. These differ in the tuning and matching arrangements. The diagram is shown as Fig 3. which is the original and missing Fig 1 of the Jan 2000 issue.

The diagram comes from the Japanese CQ Ham Radio September 1999 article of JG1UNE.

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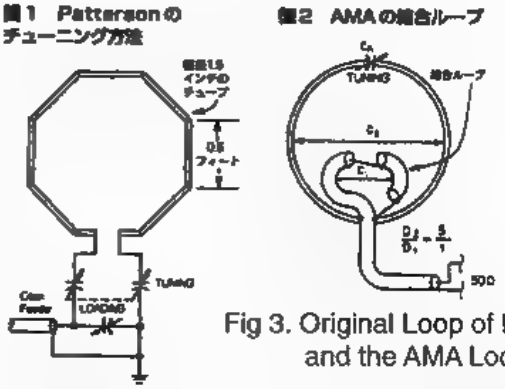

Fig 3. Original Loop of Patterson and the AMA Loop.

AMSAT AUSTRALIA
Magnuson VK3
RMB 16[illegible] Vic. 3678
Email: vk3jt@amsat.org

Y2K roll-over observations

"Everything went like clockwork ... until..."

THE "NEW MILLENNIUM" has arrived and there has been enough time now to see how it has affected matters relating to amateur radio satellites. How did you fare with your computer problems? From a public point of view it turned out to be a fairly uneventful "event" There were no major and few minor power failures. It seems that all the work done over the preceding couple of years paid off. All those unsung heroes out there in computer-land are to be congratulated on their collective perspicacity.

The same was not true however in the software department. For some time it had been known or suspected that there would be failures in some software packages used by amateur satellite users.

In my own case, as the custodian of a beloved 9 year-old 486 computer running Windows 3.1, I was interested to see just how the predicted 'fall-over' of the WiSP16 package would turn out in real life. As expected, the computer complete with bios patch turned over midnight OK and WiSP continued to run as usual. I watched as it tracked my antennas to bring in the downlink signal from Oscar-10 and nothing out of the ordinary occurred as the midnight hour came and went. There were some good signals on AO-10 that night too. North America, the Pacific, Japan and all of VK were in the footprint. I closed down the system with light heart and after a nip of muscat to see in the new year, I repaired to bed. The following morning WiSP still appeared to be working OK and I watched as it connected and downloaded the directories and messages from KO-25 and UO-22 as it usually does each morning. Everything went like clockwork ... until the dreaded midnight UT when it suddenly stopped tracking, the date went back to 1st Jan 1970 and that was that!

There is no way out of this situation as the 16 bit version of WiSP is no longer supported. This will mean an upgrade of the computer and installation of Win95 and WiSP32. All that is in the pipeline and I hope to be able to report on the success or otherwise next month. Reports indicate that there were some problems associated with keplerian element updates in many tracking programs. The InstantTrack patch worked well and IT users should all be able to continue using it. The new version is still under review and should be available soon. Keplerian element updates in some of the less popular tracking programs are still not resolved. Some of the older DOS ones are no longer supported and will have to be discarded.

Most of my other software packages have rolled over OK. One of the astronomy programs (a registered copy) is now telling me that the registration is out of date. All others are operating OK. I'll be contacting the author regarding that.

My registered version of Accuset, the

National co-ordinator:

Graham Ratcliff VK5AGR
Email: vk5agr@amsat.org

AMSAT Australia net:

The AMSAT-Australia net is held on 80 or 40 metre LSB (Lower Side Band) each Sunday evening (except over the Christmas/New Year period). During the winter months in South Australia (end of March until the end of October) the net is on 3.685 MHz +/- QRM with an official start time 1000 UTC with early check-ins at 0945 UTC. During the summer months when daylight saving is in operation in South Australia (end of October until end of March) the net is on 7.068 MHz +/- QRM with an official start time of 0900 UTC with early check-ins at 0845 UTC. The times and frequencies have been chosen as the best compromise for an Australia-wide net taking into consideration seasonal propagation changes and the various state summer time variations.

AMSAT Australia newsletter and software service:

The newsletter is published monthly by Graham VK5AGR. Subscription is $30 for Australia, $35 for New Zealand and $40 for other countries by AIR MAIL. It is payable to AMSAT Australia addressed as follows:

AMSAT Australia
GPO Box 2141
Adelaide SA 5001

Keplerian Elements.

Current keps are available from the internet by accessing the AMSAT FTP site, ftp.amsat.org and following the sub-directories to "KEPS".

Telstra computer time setting program no longer works. Again, I'll be contacting the author. Satellite tracking is not the only amateur radio area which could be affected by the roll-over. It will be interesting to read how the contest logging and DX sections fared in regard to their specialised software.

9600 baud ... old hat!

As if to whet the appetite for greater things to come, I received a stunning photograph from Colin Hurst VK5HI via the internet. It was taken from UO-36 by its earth-imaging camera. This one has to be seen to be believed. The detail is remarkable even though it's been JPEG compressed to send via the 'slower' media.

The photograph shows the town of Nogales, California. You can easily discern individual property lines, tree-lines, crops, even some detail within suburban blocks, and remember this is a JPEGed file. The original file, direct from the CCD would have been very much larger. The need for higher speed downlinks is evident from even the present state of this exciting activity.

Colin is right in the thick of it and his software, already the 'industry-standard' is continually being upgraded to keep pace with new developments as they occur. Stacey Mills has written this summing up of the present state of affairs. It is re-printed from the AMSAT-BB.

38,400 Baud Satellites

Stacey Mills W4SM.

If you are tired of the "slow" 9k6 baud sats, now may be a good time to look into what it takes to go to the 38k4 downlinks. At least two of the current satellites, TO-31 and UO-36 have this capability. P3D's RUDAK has multiple high speed modems and is likely to be very active at 38k4 as well.

Several of us have been working with Chris Jackson to tweak WiSP to function best with these new satellites, and I believe that they (at least UO-36) will be widely available soon. Even now UO-36 is often transmitting over the US and Australia (437.025) when Colin VK5HI is active in Adelaide. The uplink on these satellites is 9k6 baud, so if you're active on UO-22/KO-25, etc., no changes are needed on the transmit side. However, the extreme bandwidth of the downlink at 38k4 necessitates some receiver changes as all the current ham rigs are too narrow to handle this.

However there is a very good, relatively inexpensive solution. SYMEK (www.symek.com) a German company in Stuttgart, makes a small receiver/ demodulator board that intercepts the data stream from your transceiver's IF. These IFD boards cost DEM 235 (about A$200). They come with excellent installation instructions (in English if appropriate) and are available for most of the major satellite transceivers and receivers used by amateurs. If you don't see your rig listed, drop them a note and they'll work with you to get you an IFD board. I ordered using a credit card over the internet and my modules were received in a few days. I've installed one in a Yaesu FT-736_R and another in a Kenwood TS-790A. The Yaesu installation is very simple and the Kenwood is only a little more involved. Anyone comfortable making the 9k6 modifications should easily be able to handle this. Importantly, normal function of the radios is not affected.

With regard to a modem that will handle 38k4 downlinks, there are several options. I've been told that the standard G3RUH 9k6 FSK modem can be adapted to run at this speed. There's also been a discussion that a DSP56002EVM board is capable (just) of running at this rate and some software may be available for this modem on the TAPR web site. I have not pursued either of these solutions, so I can't comment further.

Symek has two very high speed modems (up to 614K baud!) that work extremely well. One is a two port version (TNC3S) and the other, less expensive one is single port TNC31S. Mine is set up to wake up in KISS mode with 38k4 downlink, 9k6 uplink, and a 57k6 PC connection.

The downlink at 38k4 on UO-36 is really spectacular! Watching the byte counter fly by is quite a treat. Efficiencies of 90-100% are easily obtained with directional antennas and a pre-amp. Doppler tuning is not necessary on the widebanded 435 MHz downlink . Downloads of 1.5 Megs are possible on single passes, and all three components of a colour image can be captured in short order. I used to think 9k6 was fast, at least compared to 1k2 on AO-16, now when I look at KO-25/UO-22, the byte counter seems to be moving in slow motion! To me at least, this high speed (internet level) transfer rate, and the ability to grab images on a single pass, really brings some excitement back to the digital sats.

STANDARD DISCLAIMER: I am not an employee of Symek and I receive no compensation from them... just a very satisfied customer wanting to spread the word. Hope to see you in the queue(s) soon.

Stacey Mills W4SM.

73 until next month, Bill VK3JT

NOTICE

FEDERAL WIA CONVENTION

APPOINTMENT TO FEDERAL POSITIONS

The Federal Convention and Annual General Meeting of the WIA will be held in Melbourne on 29/30 April 2000

At this meeting, a number of positions will be filled. Nominations must be received by the Federal Secretary by 17 March 2000.

The positions are

President
Directors (3 positions to be filled)
Company Secretary

Editor "Amateur Radio" magazine
Publications Committee (5 positions)
WIA/ACA Liaison Committee (3 positions)
IARU Region III Liaison Officer

ITU International Regulatory and Radiocommunications Study Officer
Federal Media Officer
Federal Web Page Coordinator
Chairman Federal Technical Advisory Committee
Federal Education Coordinator
Historian
AMSAT Coordinator
Intruder Watch Coordinator

Federal Contest Coordinator
Federal Awards Manager
Federal WICEN coordinator
International Travel Host
ARDF Coordinator
Federal QSL Manager
VK5/VK0 QSL Bureau
QSL Collection Curator
Videotape coordinator

Nominations received direct will be considered but preference is likely to be given to Divisional nominees

VHF UHF AN EXPANDING WORLD

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Web page: http://www.ozemail.com.au/~tecknolt
Fax: (08) 82346396
Phone: 0414 808060 (before 2130 EST please)

All times are UTC

6 Metres

Sporadic E is still around despite the imminent solar peak. Throughout December and early January 2000, various peaks have occurred with Es 6 Metre paths up to 3500km (VK5 – 3D2 attributed to Es). F2 & TEP openings seemed to curtail around late November except for the reported openings on 14/12/99 to USA & Central America and the odd JA to VK4 & VK6 TEP opening. After the F2 openings, Es was slow to return from a dormant state in most areas.

Overseas it has been much the same with some TE on the USA to South American path around mid December and again around 9/01/00. Subtracting 11 years from today and looking at the conditions in late 88, opinions are varied as to how this cycle is travelling. To be sure I think the next equinox period, i.e. from when you read this to the end of April, will tell much if not all!

Gordon VK2ZAB reported 50 MHz being open from the Sydney area to the Carribean, Mexico, USA, Korea & ZL from about 2200z 13/12/99 thru about 0200z 14/12/99.

VK3's and VK1's were heard working N6XQ on 50 MHz 13/12/99 22:39Z. It appears that the opening extended from VK4 to VK1, VK2 & VK3. At this stage no further details have been forthcoming from other individuals. A slightly unusual time for such an extensive opening!

John VK4FNQ reports working the following, 01/01/00 0800 JA6LZG, 9/01/00 0609 YJ8UU. John also reports hearing the P29BPL beacon on 50.029 MHz, 11/01/00 @ 600, 599

11/1/00 YJ8UU was also heard ~0600Z working into VK4, by Eric VK5LP & Steve VK5AIM. Neither was able to break through the pile-ups. Eric also reports hearing 3D2AG, Antone, on 1/01/00, 3/01/00 & 11/1/00 at 0200 –0230 each time up to S8 at Meningie. Again unable to break through the eastern seaboard stations!

John, VK4KK reports that the P29BPL beacon, PNG, has been heard in the Brisbane area on 50.029 MHz. Last information on this beacon put the location of this beacon as QI30. No further information is available.

Bill VK6JQ writes to correct an item that appeared in this column in December 1999. The callsign heard on 7/11/98 at 842 was IW5BML (not IW5BMI). Also on 8/11/98 Bill heard A45ZN, but did not work him. After the contacts described last month things have been quiet in Broome ... *" Since the last Europeans came in on the 18th of November, 6 Metres has died, only one JA Contact on the 30th of November and Nothing Since."* ... VK6JQ

2 Metres Sporadic E's

Several 2M Sporadic E openings have been logged so far this season. Interestingly, the recording of ZL to VK3 contacts in Mid November perhaps underlines the complexity of Es during the upper side of the sunspot cycle.

The Japan Century-Cities Award

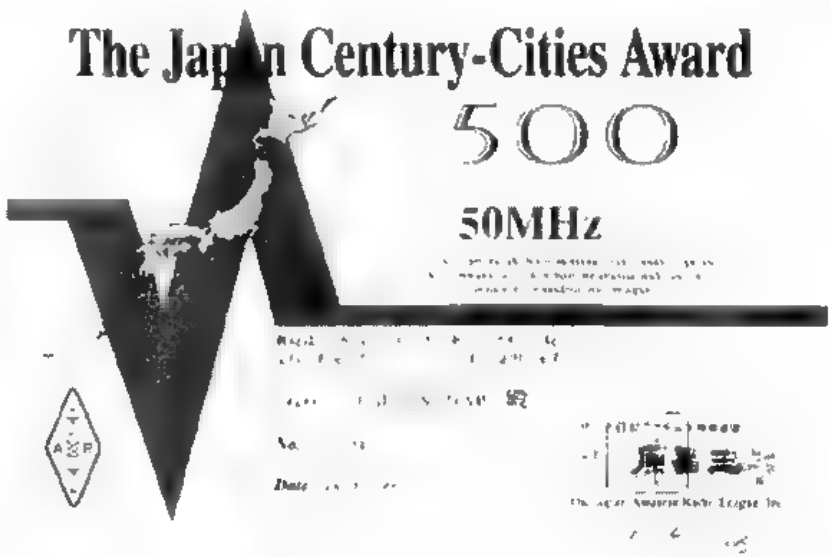
John Bisgrove, VK4KK (VK4ZJB) of Brisbane has completed a very difficult milestone in VK amateur radio history.

On 15 July 1990, he received Certificate Number 75 for confirming six metre contacts with 400 cities in Japan. For many that would have been sufficient but John kept going and on the 14th of December 1999 was awarded Certificate Number 56 for 500 cities confirmed!

John says *"It took me 33 years to collect 500 cities, 23 years of which were during the miserable Channel 0 days. There are a minimum of 600 plus cities in Japan, but to work more than 500 will be very difficult as most have no six metre operators. To keep track of those stations I had worked, I filled most of the 190 pages in a school exercise book."*

This is a great achievement and surely congratulations are due to John for his dedication to the task of achieving the almost impossible A smaller reproduction of his four colour certificate is shown here.

Thanks to Eric VK5LP for submitting this item.



Ron, VK3AFW reports ... *"Just a note for the record ... 15 Nov 1999, 0859 Max, VK3TMP worked ZL3NW, 0900 Trevor, VK3KEG worked ZL3NW, 0902 Steve, VK3ZXR worked ZL3NW and ZL3AIC (not sure about last letter of*

call, might have been AIT). Steve is at Cnb point and was using an omnidirectional vertical.

0945 ZL3TY heard 5x3 in Melbourne and most of SE Victoria for a short

burst, probably a meteor, but possibly a fortuitous tilt of the E layer

giving enhanced propagation. Except for the burst mentioned above, zilch heard from ZL here in 3 hours of monitoring" ... VK3AFW

Gordon VK2ZAB reports the following ZL contacts on 14/12/99 via Sporadic E, 0220z 14/12/99 VK2ZAB - ZL2TAL. 0222z VK2KU - ZL2TAL. 0235z VK2KU - ZL2TE and 0236z VK2ZAB - ZL2TE."

Gordon writes ... "The Auckland 2M beacon was up to S5 here shortly before these contacts were made and the Wellington 2M beacon was also up to S5 about 15 minutes after the contacts. No contacts were made to the Auckland or Wellington areas and the two ZL2s contacted are both from the New Plymouth area roughly halfway between the two beacon sites."

Rob VK3EK\DEM at Bairnsdale (QF32te) reports working the following stations on 144 MHz on 14.12.99. 0752 ZL3TIC 53, 0756 ZL3AIC 59, 0757 ZL3NW 55, 0817 ZL3TY 55, 0820 ZL3NB 55, 0832 ZL3AAN 55, 0833 ZL3TIB 55, 0855 ZL4DK 55

Guy Fletcher, VK2KU reports ... *"We had a very brief Es opening yesterday (Monday) morning local time, about 2 days earlier than usual. Actually last year we had no VK2-VK5 contacts but the Mt Lofty beacon was in strongly on 2m for about 15 minutes. 09 Jan 2000 at 2341Z, VK2KU worked VK5AKK (57, 59) and VK5ZBK (58, 59) on 144.180MHz."* ... VK2KU

Barry Miller, VK3BJM, reports the following Sporadic E on 10/01/00 ... *"It didn't last long, unfortunately. Between about 0205z and 0220z I heard John VK4FNQ worked the following on 2m: VK3XPD, VK3XQ, VK3AMK, VK3BJM, VK3BRZ, VK3ZQB, and VK3BDL. The signal into Box Hill was gone completely while John worked Chas, VK3BRZ, but came back up while John worked Russell, VK3ZQB, and Mike, VK3BDL.*

Attempts were made on 70cm with Alan, VK3XPD, and Chas, who both have enough grunt and antenna gain to make it worthwhile, but no reports were exchanged; nothing was heard at either end. Lots of northern Australian 6m beacons were heard at the time (all the VK4's and the Darwin beacon), but nothing from the Townsville 2m beacon." ... VK3BJM

To expand on the above John VK4FNQ from Charters Towers (QG39EX) reports the following contacts and stations heard on 2 Metres from the 9th to the 11th of January 2000.

9/01/00 0148 VK2MP Heard on 144 MHz

10/01/00 Worked the following on 144 MHz 0207 VK3XQ, 0208 VK3AMK, 0209 VK3BJM, 0211 VK3BRZ, 0213 VK3ZQB 59, 0215 VK3JWZ, 0220 VK3BDL, 0221 VK3KAY, 0224 VK5DK Hrd only

11/01/00 Worked the following on 144 MHz 0236 VK2ZAB, 0238 VK2EM.

Tropospheric DX

Tropo DX has varied across the country; some paths have been up to standard while others, notably the VK3/5 to VK6 path, have almost been totally absent.

Ron Cook, VK3AFW reports ... *"VK3CY to VK7XR 5x9, 5x9 at 2110 13/12/99 Est. 550 km +, VK3AFW to VK7XR, 5x7, 5x7 at 2112 13/12/99 420 km*

VK7RAE beacons, 144.474, 529, 432.474, 519. VK3AFW & VK7XR tried 432.150 MHz at 2220, nil. 432 MHz beacon gone at 2140. VK5RSE beacon 559 144.550 MHz, 539 with QSB on 432.550 MHz. No other interstate beacons heard."

Chas VK3BRZ reports ... *"Both David VK3XLD and I worked Peter VK7ZPB at Whitemark on Flinders Is. yesterday evening (20/12/99) around 0900Z on 70cm. Peter's signal was up to S9 with some QSB"* ... VK3BRZ

On 26/12/99 David VK5KK worked Colin VK5DK in Mt Gambier on 432.150 MHz at 1135, 56 both ways. Distance 410 km however through the big lump of dirt in the way to the SouthEast. Maybe I should call it the 30 db Hill!

On 7/01/00, the band opened to Albany on 144 & 432 MHz after a poor previous 6 weeks. VK5KK worked Wally VK6WG on 144.1 MHz @ 1210, 56 both ways followed by 432.120 MHz @ 1218. Signals on 432 MHz down on 144 MHz averaging only 41 – 51. The 144 MHz contact was repeated again at 1300. The arranged sched for 2230, next morning, passed with no signals being heard. Locally, intense enhancement was evident out to Ceduna (~560km) with the usual VHF and UHF (CB) repeaters to the west, the strongest this season. By 08/01/00 Conditions had started to slide through to the east as evidenced from the following report from VK7MO.

Rex, VK7MO at Kingston, 12 km South of Hobart reports working VK3EK at Bairnsdale on 432 MHz on 11/01/00 at ~2200. The distance for this contact was 594 km. At 1950 on 12/01/00 the Latrobe Valley Beacon, VK3RGI, was 57 in Hobart and quite steady over a ten-minute period.

Forward Scatter on 144 MHz

Emil Pocock, W3EP reports on some extraordinary Forward Scatter 144 MHz contacts in the US . . *"Contacts at 144 MHz are rare, yet Jay Liebmann, K5JL (EM15), Don Stradley, WA1JOF (FN44), and others have been having some startling success. WA1JOF has been running with KB8RQ (EN80) around 155 in the mornings over the past year and a half. The pair have never failed to work over their 1050 km path. Signal strength during evening runs were noticeably weaker, but they could still eke out contacts. Don has also made it with WA9KRT (EN61) with similar results. He notes that signals are usually detectable, but there is a surging effect about every 30 seconds when the signal rises above the noise. Sometimes, several minutes may go by until the faint signal is heard again". "K5JL has made some even more impressive ionospheric forward scatter contacts. On November 8, Jay worked VE1ALQ (FN65) at an incredible 2850 km. Well done! He noted that signals were just detectable in the noise most of the time. Necessary exchanges and rogers were made during those period periods when signals rose clearly out of the noise. No distance records have been claimed for ionospheric forward scatter so far, but 2850 km certainly must be one of the longest such contacts ever reported. Jay also completed with WA1JOF on November 11 around 1600 over another impressive distance of 2546 km."* ..... thanks W3EP & QST. It should be noted that all stations used EME class power and antennas, still 2850km's is a long way via any mode except TEP.

Microwaves (1296 and above)

On 01/01/00 at 2334z, Gordon VK2ZAB, Sydney worked Rod VK4KZR in Brisbane on 1296.16 MHz SSB. Signals were 51 both ways. Distance is 713+ km and the QSO is thought to be the first such on 23cm contact between Sydney and Brisbane and between QF56 and QG62. Contact made again on the following morning.

Jumping to the other end of the Microwave area, Russell VK3ZQB, reports that his web site has been updated with all the latest 24 GHz developments at Pt Fairy. Russell's Website is well worth a visit at www.ansonic.com.au/vk3zqb/. For the past few years a group of five amateurs (VK3XPD, VK3ZQB, VK5DK, VK5NC & VK5KK) have pooled efforts on several

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microwave projects to get various complete systems going

The group is loosely called the Australian Microwave Users Group (AMUG for short!) The group meets in Pt Fairy at least once a year, although some have been known to visit Pt Fairy on multiple weekends! The 24 GHz project has perhaps been the most challenging, but on last report Russell has 80mW's out of at least one 24 GHz system!

Now for something different. It may come as a surprise to some (and perhaps not to others) that the quickest growing area of activity above 1200 MHz is ATV. While AM TV has been the mainstay of ATV activity on 70 cm, FM TV has become the dominant mode above with Pockets of activity growing in all states. The loss of 576 MHz outputs for repeaters in a couple of states on 31/12/99 also seems to have people on the move.

Having seen the number of 1250 MHz ATV FM TV kits sold over the last 8 years (more than 200), through the VK5 Equipment Supplies, there would seem to be a definite trend. Perhaps it is the attraction of building something akin to a 1960's VHF AM transmitter and operating in a portion of the spectrum where ultimate stability is of minor concern when you have an 18 MHz wide channel!

Most the activity is on 1200 MHz with some repeaters having outputs on 2400 MHz. VK5RLZ in Adelaide has been running 25 Watts on 2415 MHz (2372 MHz pre-MDS) since late 1993. A few VK5's have also been running 2.4 Ghz simplex with powers between 2 & 10 Watts.

Barry, VK5BQ, at Stansbury, Yorke Peninsula has an impressive Microwave ATV setup Barry runs ~20Watts on 1250 MHz into a 2.1 metre dish and several watts on 2439 MHz into a 1.2 metre dish. Barry's closest contact, so far, is about 70km's as the first 60km's of any path is over water! Barry can work several Adelaide stations regardless of band conditions with P5 signals. The longest contacts so far are only a few km's short of the current Australian TV Distance records for both bands. And no one has gone portable yet!

At last count Barry has worked over 20 VK5 amateurs on 1250 MHz and above.

Work is progressing on equipment for 5825 MHz for portable work

On a final note regarding ATV, a recent letter from the Australian Broadcasting Authority (ABA) to the Secretary of the WIA SA & NT Division, paved the way for the renewal of the WIA/SA ATV Groups VK5RTV license on Channel 35 (576.25 MHz) AM TV till 31/12/2000. The ABA have been most co-operative in this instance and responded warmly to a 38-page submission prepared by the SA ATV Group.

As a fallback, the group has now obtained a license to operate 25 watts on 2439 MHz from the O'Halloran Hill Site. This will be commissioned in early 2000.

VHF Communications Magazine

"VHF Communications" and its German parent Magazine "UKW-Berichte" have been part of the global "VHF" Scene for over 30 years. Over these years, the magazine has been at the forefront of Amateur "VHF & Above" equipment design.

The original magazine was translated from the German UKW and published by Terry Bittan from the seventies till his untimely death in a 1985 airplane crash. For the past ten years Michael & Krystyna Wooding have published the magazine as KM Publications, in the UK.

The 4/99 issue marks yet another change in the magazine's history with Andy Barter, G8ATD taking over the role of publisher. Andy has been licensed since 1965 and is active on UHF and SHF contests in the UK, chiefly on 70 & 23 cm's.

The Australian agent for VHF Communications is VK5 division of the WIA Subscriptions for 2000 can be paid for up to 29/02/00 by forwarding $47-00 (Seamail) or $62-00 (Airmail) to the "WIA SA & NT Division Inc" GPO Box 1234 Adelaide SA 5001

Beacon Update

The Adelaide "Mount Lofty" Beacon site, VK5VF, received some long deserved attention to its tower on 4/12/99 VK5VF's antennas have been installed on the same "Stobie" pole (Cement/Steel Power pole) since 1964.

The actual pole has been in place since well before WW2, being made redundant when the TV stations were installed at Mount Lofty in the late fifties! Apart from the vertical mast being replaced in 1978, nothing has been changed to the pole structure for over 35 years. Corrosion had, however, caught up with most of the original brackets. A new vertical mast to 12.5 metres has now been installed with quick release brackets so the main section can be accessed with minimal assistance.

Other changes made include the installation of a temporary 1296 MHz 22 element yagi beaming to give a service area from 120 – 155 deg., i.e. from the edge of Melbourne to Mt Gambier. ERP in this region is estimated at 200 Watts ERP. Colin, VK5DK, has reported hearing the beacon on several occasions since the upgrade. A new 1296 MHz Omni directional slot will be installed later this summer, however if the South East beam proves useful, this will be still made available on a time share basis (2.5 minutes per antenna)

All other VK5VF beacons from 50 MHz to 10 GHz are operational except for 3 & 5 GHz in various stages of testing.

Colin VK5DK reports that the VK5RSE 144.550 MHz beacon currently has a problem with its NW (Adelaide) beam antenna. Eric VK5LP reports that, as a result, the VK3RGL beacon on 144.530 MHz has been heard on atleast one occasion at a strength greater than VK5RSE, despite near double the distance (530km).

Russian Metaloceramic Tubes

Those who subscribe to various email reflectors overseas, e.g. Microwave and VHF reflectors, would have seen the emails emanating from the Ukraine advertising various Russian made VHF/UHF Power triodes and tetrodes ranging from 400watt to >1.5kW over the past two years.

The GI7B and GS23B are just two of the more common tubes, the former is capable of operation on 23cm @ +300 Watt output. Curiosity got the better of me and after some emails to Alex, UR4LL and a 2 week wait, two GI7B's arrived in a brown paper wrapped parcel tied with string. The GI7B could be described as a rough equivalent to the Eimac 8874 but at about 1/12th the price and the approx. physical size and layout of a 200% enlarged 2C29A!

With the tubes came a detailed "Starting Procedure". Essentially a series of steps from filament only to standing current only 50% & 100% HV then 30minutes at full drive. All this, I gather is aimed to clean the directly heated cathode and stabilise the gas emission effects.

Both tubes have passed the static test (no RF) so the next step is to build a 432 MHz amplifier. I'd be interested to hear from others who have (or haven't) progressed past this with a GI7B project. From what Alex described, a number of VK's have traded with him over the past year or so!

In Closing

Quite a mixed bag this month, I hope that the broad range gave something of interest to all readers. I must thank Eric, VK5LP, again for his help and input this month. Without further ado...

1. Knowledge cannot make us all leaders, but it can help us decide which leader to follow"
2. Patience is the art of concealing your impatience"

Till next month

73's David VK5KK

AWARDS

John Kelleher VK3DP
Federal Awards Officer
4 Brook Crescent, Box Hill South, Vic 3128 (03) 9889 8393

Roll of Honour

VK5MS	331/385
VK5WO	331/364
VK3QI	331/345
VK4UA	331/345
VK3DYL	331/337
VK2FGI	331/337
VK4LC	330/337
VK6HD	330/356
VK6LK	330/355
VK4OH	330/337
VK6RU	329/384
VK1ZL	329/336
VK3AKK	327/338
VK6NE	325/341
VK2DEV	325/331
VK3AMK	321/340
VK5EE	321/127
VK3YZ	320/328
VK4AAR	320/324
VK2AVZ	319/330
VK7BC	319/329
VK6VS	319/323
VK3CSR	316/325
VK5FV	314/317

Ord List

VK6AJW	312/317
VK6APK	310/315
VK5WV	306/326
VK6PY	306/312
VK3JI	304/319
VK6RO	302/308
VK3IR	302/306
VK4DP	293/305
VK4SJ	292/293
VK2WU	291/296
VK4LV	289/291
VK4BG	286/302
VK4ICU	286/288
VK3CYL	282/288
VK3DP	271/274
VK4CY	271/273
VK3GI	263/267
VK3VQ	259/276
VK5IE	258/261
VK4BAY	251/254
VK3UY	251/253
VK3CIM	250/254
VK4EJ	250/252
VK6ANC	244/248
VK2PU	243/247
VK6YF	238/241
VK7TS	237/238
VK6ABS	235/
VK2CKW	234/237
VK6APW	228/229
VK3DS	226/236
[illegible]	226/227
VK3SM	222/242
VK5BO	217/222
VK3DD	213/217
VK4EMS	[illegible]
VK4XJ	204/216
VK3DVT	201/204
VK3EFT	198/201
VK4IL	194/
VK4AU	189/190
VK2HV	186/
VK6WJH	183/
WA1M[illegible]	171/
VK6APH	168/169
LU5DSE	161/
VK4ARB	159/160
VK3NC	157/
VK4IT	154/155
VK4CHB	152/153
VK2FHN	149/
VK4DMP	147/148
VK2GSN	147/
VK7JAB	147/
VK2UK	146/149
VK2SPS	141/143
VK3DNC	141/142
VK6LC	139/140
VK2EQ	139/
VK6LG	134/135
VK3DQ	133/147
VK2LEE	130/132
VK4AO	127/
TI2YLL	127/
VK4VIS	126/128
YC8EMH	126/127
TG8NE	125/
VK3TI	122/125
SM6PRX	121/126
HL4YD	118/119
VK7WD	115/116
VK5GZ	113/115
VK4IT	154/155
VK4CHB	152/153
VK2FHN	149/
VK4DMP	147/148
VK2GSN	147/
VK7JAB	147/
VK2UK	146/149
VK2SPS	141/143
VK3DNC	141/142
VK6LC	139/140
VK2EQ	139/
VK6LG	134/135
VK3DQ	133/147
VK2LEE	130/132
VK4AO	127/
TI2YLL	127/
VK4VIS	126/128
YC8EMH	126/127
TG8NE	125/
VK3TI	122/125
SM6PRX	121/126
HL4YD	118/119
VK7WD	115/116
VK5GZ	113/115
VK7LUV	113/
VK4NJQ	111/115
VK6NV	111/113
JA8XDM	111/
C21DJ	109/
JE9EMA	108
VK5UO	107/110
HC2HYB	106/107
VK4LW	105/
VK2EJK	104
JN6MIC	103/104
ZS6IR	102/104
KB2NEK	102/103
C21NJ	102/
VK2FZR	102/
JHOHO	101/103
VK2EJM	101/103
VK2IRP	100/101
ON4BCM	100

Roll of Honour

VK6HD	331/352
VK3QI	331/343
VK5WO	323/339

CW Ord List

VK3KS	307/335
VK6RU	278/322
VK4LV	278/285
VK4ICU	272/
VK3JI	271/296
VK3AKK	270/275
VK4KU	251/
VK6MK	243/245
VK3DP	242/245
VK2CWS	239/241
VK3DQ	234/261
VK7BC	234/243
VK3CIM	228/229
VK4DA	226/228
VK4CY	207/208
VK4DP	205/216
VK7RO	201/204
VK6PY	190/194
VK5GZ	189/191
VK6HW	179/182
VK5UO	165/166
VK7TS	165/
VK5BO	159/164
VK3DNC	154/157
VK4XJ	150/163
WA5VGI	146/148
VK4UA	143/145
VK4AAR	139/141
VK7DQ	131/132
VK2TB	123/125
VK7CQ	120/122
DK6AP	120/
SP1AFU	112/113
VK6KV	112/113
VK5BWW	110/111
VK6NV	109/110
OK1FED	109/
VK2FYM	106/108
VK4CXQ	106/
VK3DG	102/
VK6XC	101/103
SM6PRX	101/102

Roll of Honour Open

VK5WO	331/368
VK6HD	331/358
VK4UA	331/347
VK3QI	331/348
VK6RU	330/385
VK4LC	330/377
VK3AKK	327/338
VK7BC	327/336
VK3JA	323/371
VK6AMK	322/341
VK2AVZ	320/330
VK4AAR	320/324
VK4AAR	320/324
VK3UY	318/321
VK3JI	315/344

Open Ord List

VK4DP	309/323
VK6PY	308/316
VK6RO	308/314
VK4LV	307/311
VK4DV	306/321
VK3DP	304/308
VK4CY	297/301
VK4ICU	297/299
VK4BG	293/312
VK3CYL	282/288
VK3VQ	274/291
VK3CIM	274/278
VK5BO	264/264
TI5BW	260/264
VK7TS	252/254
VK6MK	250/252
VK6ANC	247/250
VK3DQ	246/275
VK5UO	246/250
VK2CWS	245/247
VK6APW	239/240
VK2ETM	238/240
VK4XJ	233/249
VK4DA	227/229
WA5VGI	216/218
VK4EMS	216/
VK2EFT	202/205
VK5GZ	198/200
VK2HV	187/
VK3DNC	185/187
VK6APH	171/172
9A4KA	168/

RTTY DXCC Listings — in Certificate Order

001	Silent Key	
002	Silent Key	
003	VK5RY	100/102
004	VK2BQS	121/123
005	VK3EBP	237/239
006	VK3AMK	100/102

It is hoped that with the slow improvement in conditions, this list will grow accodrdingly.

Erratum: In the June issue of AR Magazine, referring to the Worked Scandinavian RTTY Award, I am reliably informed that the Award Manager, Bo Ohlsson is a Silent Key. I will attempt to find the details of his successor

Best regards, and good hunting

de John VK3DP

CONTESTS

Ian Godsil VK3DID,
57 Nepean Highway, Aspendale, 3195

Contest Calendar February - April 2000

Feb 5/6	Ten-Ten Winter Party (SSB)	
Feb 12/13	WW RTTY WPX Contest	
Feb 12	Asia-Pacific Spint (CW)	(Jan 00)
Feb 19/20	ARRL International DX Contest (CW)	(Jan 00)
Feb 26/27	RSGB 7 MHZ Contest (CW)	(Jan 00)
Feb 26/27	REF SSB Contest	(Jan 00)
Feb 26/27	Jock White Field Day NZ (CW/SSB)	(Jan 00)
Feb 27	High Speed Club CW Contest	
Mar 4/5	ARRL International DX Contest (SSB)	(Jan 00)
Mar 11/12	RSGB Commonwealth Contest (CW)	(Feb 00)
Mar 11/12	World Wide Locator DX Contest (CW/SSB)	(Feb 00)
Mar 18/19	John Moyle Field Day (SSB) - VHF/UHF	(Feb 00)
Mar 18/19	Russian DX Contest (CW/SSB)	(Feb 00)
Mar 25/26	CQ WW WPX Contest (SSB)	(Feb 00)
Apr 1/2	SP DX Contest (CW/Phone)	
Apr 7/9	JA DX CW Contest (High Band)	(Dec 99)
Apr 8/9	King of Spain DX Contest (CW/Phone)	
Apr 15	Australian Postcode Contest (CW/SSB)	
Apr 15/16	Holyland DX Contest (CW/Phone)	
Apr 22/23	Helvetia DX Contest (CW/Phone)	
Apr 22/23	SP RTTY Contest	
Apr 24	Low Power Spring Sprint (CW)	(Feb 00)

Thanks this month to ANARTS UBA 4Z4KX VK2CTD RSGB VK6NE

RESULTS ANARTS RTTY CONTEST 1999

from Col VK2CTD Contest Manager

(World posn\call\cat\score)

4	VK2SG	SO	22,014,954	1st VK2/1st OC
32	VK4UC	SO	6,424,992	1st VK4/3rd OC
95	VK2CTD	SO	1,285,270	2nd VK2
106	VK8HA	SO	1,097,920	1st VK8
148	VK2BQS	SO	250,728	3rd VK2
3	VK6GOM	MO	9,145,500	1st VK6/1st OC

RESULTS UBA CONTEST 1999

CW (Call\cat\score)			*SSB (Call\cat\score)*		
VK4TT	SO20	1496	VK2APK	SOAB	25168
VK2APK	SOAB	44880	VK5EMI	SOAB	540

RESULTS HOLYLAND CONTEST 1999

(Pos\call\cat\score)

235	VK4ICU	Mixed	143
254	VK8AV	CW	16

RESULTS VK/ZL/OCEANIA CONTEST 1999 (VKs ONLY)

from Neil Penfold VK6NE

(Call\score)

Phone	*CW*		
VK2APK	557968	VK2AYD	1329408
VK2FHN	521268	VK2APK	214800
VK3AJJ	2204264	VK2QF	464490
VK3ER	621452	VK4TT	218040
VK3IO	383350	VK4UC	31160
VK4UC	2217330	VK5GN	202872
VK4EMM	2081489	VK5AGX	17380
VK4PJ	3145	VK6ZH	429300
VK5GN	2575126	VK8AV	237600
VK5AM	983252		
VK7JAB	780		
VK8AV	39296		

Check Log: VK3AMD thank you.

COMMONWEALTH CONTEST 2000

11 - 12 March
1200z Sat - 1200z Sun

OBJECT: to contact as many amateurs as possible in the British Commonwealth and Mandated Territories. Contacts with own call area not permitted.

BANDS: 160 - 10m (no WARC).

FREQUENCIES: contestants should operate in lowest 30 kHz of each band, except when contacting Novice stations.

MODE: CW only.

CATEGORY: Single operator. No assistance of any type is permitted.

SECTIONS: Open - unrestricted operating time; Restricted - maximum 12 hours' operation. Off periods to be clearly marked in logs and to be of minimum 60 minutes.

Also, at least four hours' operation to take place after 0000z 12 March.

SEND RST plus serial number. HQ stations will add 'HQ'.

SCORE: five points per QSO, with bonus of 20 points for first three contacts with each Commonwealth Call Area on each band. Note - entire UK counts as one call area and HQ stations count as additional call area.

LOGS: separate logs and bonus lists for each band. Include Summary Sheet showing section entered and points claimed on each band.

SEND LOGS to: RSGB Contests Committee, 77 Benson Manor Road, Thornton Heath, Surrey, CR7 7AF, UK, by 5 April, 2000.

Commonwealth Call Areas are: 3B6/8/9 3DA 4S 5B/H/N/W/X/Z 6Y 7P/Q 8P/Q/R 9G/H/J/L/V/Y 9M0/2/6/8 A2/3 AP C2/5/6/9 CY0/9 G/GB/GD//GI/GJ/GM/GU/GW (all one area) H4 J3/6/7/8 P2 S2/7 T2/30/31/32/33 TJ V3 (Antigua, Barbuda, Belize) V4/5/8 VE1-9 VK0 (Heard, Macquarie) VK1-8 VK9C/L/M/N/W/X VO1/2 VP2E/M/V VP5/8 (Antarctica, Falkland, S.Georgia, S.Shetland, S.Orkney) VP9 VQ9 VR6 VU VU4/7 VY1/2 YJ Z2 ZB2 ZC4 ZD7/8 (Tristan da Cunha, Ascension) ZF ZK1 (N.Cook, S.Cook) ZK2/3 ZL0-4 ZL7-9 ZS1/2/4/5/6/8 and various HQ stations.

RUSSIAN DX CONTEST

18/19 March
1200 Sat - 1200z Sun

BANDS 160 - 10 m (no WARC).

SECTIONS. Single Operator; CW, Phone, Mixed; single or all bands.

MODES: CW, SSB Mixed.

EXCHANGE RS(T) plus serial number starting with 001. Russian stations will send serial number plus two-letter Oblast code (max 88 + 3 on each band).

SCORE: 10 points per Russian QSO, five points for QSOs with stations on another continent, three points for stations in the same continent and two points with your own country. Continents as per WAC.

FINAL SCORE is total QSO points by number of DXCC countries and Russian Oblasts worked on each band.

SEND LOGS and summary sheets postmarked by 12 April 2000 to: Contest Committee SRR, PO Box 59, 105122 Moscow, Russia.

Oblast designators are: AB AD AL AM AO AR BA BO BR BU CB CK CN CT CU DA EA EW GA HA HK HM IR IV JA JN KA KB KC KE KG KI KJ KK KL KM KN KO KP KR KS KT KU LO LP MA MD MG MO MR MU NN NO NS NV OB OM OR PE PK PM PS RA RO SA SL ST SM SO SP SR SV TA TB TL TM TN TO TU TV UD UL UO VL VG VO VR YA

LOW POWER SPRING SPRINT

24 April Easter Monday
1400z - 2000z

MODE: CW only.

BANDS: 160 - 10m (no WARC).

CATEGORY: Single operator only, one-, three- or all-bands.

POWER: A: 1W; C: 5W; Q: 25W; X: 50W; Y: 100W

EXCHANGE: RST, IARU Locator (first four designators) and power (eg 579 QF22 A). Reception of RST sufficient for non-contest stations.

SCORE: three points per QSO with own continent; nine points with other continents; 18 points per QSO with OM stations.

MULTIPLIERS per band are IARU locators and prefixes (WPX rules).

FINAL SCORE is total QSO points X total multipliers. Note - no cross-band QSOs and unmarked duplicates penalized.

LOGS: separate logs for each band. Show full information for each QSO, with list of multipliers and dupe sheet for each band. Summary sheet must show date, callsign, address, power, valid QSOs, multipliers, points for each band, locator, rig description, antenna.

SEND LOGS to: Radioclub OMN3KFV PO Box 29, 036 01 MARTIN 1, Slovakia, by 23 May, 2000

WORLD WIDE LOCATOR DX CONTEST

11 - 12 March
0000z Sat - 2359z Sun

OBJECT: to work as many world-wide grid squares as possible.

BANDS: 160 - 10m (no WARC)

MODES: CW, SSB, Mixed.

CATEGORIES: A - single operator CW; SSB; mixed; all bands; duo-bands; single band; low power (max. 100W o/p); high power (more than 100 W o/p). 36 hours' max. operating time. No packet. B - Multi-operator CW; SSB, mixed, single tx 10 minutes rule band and mode; two tx 10 minutes rule, multi-multi. Packet allowed. C - SWL single operator no packet.

EXCHANGE: RS(T) plus WWL (eg QF22).

SCORE: one point for each 500 kms. except on 80m two points per QSO and on 160m four points per QSO

MULTIPLIERS: first two characters of WWL on each band separately (regardless of mode).

FINAL SCORE is sum of QSO points X total multipliers.

NOTE: It is not necessary for entrants to calculate scores, as Contest Manager will do this

LOGS: ONLY electronic logs. Any ASCII log accepted, but recommended software is N6TR.

SEND LOGS to: Karel Karmasin OK2FD, Gen. Svobody 636 674 01 Trebic, Czech Republic by 14 May. Logs may be sent by e-mail to: ok2fd@contesting.com or ok2fd@okdxc.cz

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WORLD-WIDE WPX CONTEST

SSB: 25 - 26 March
CW: 27 - 28 May
0000z Sat - 2359z Sun

OBJECT: to work as many stations world-wide as possible.

BANDS 160 - 10m (no WARC).

CATEGORIES. single operator single or all-bands; unrestricted power, low power (max 100W o/p), QRPp (max. 5W o/p); multi-operator single or multi-tx, all bands only. Single operator stations are where one person performs all operating, logging and spotting functions.

NOTE: single operators may only work 36 out of total 48 hours' operation. Off periods must be at least one hour and clearly marked in log. No time limits apply to multi-operator stations. Multi-multi stations must have all txs located within a 500m diameter circle or within property limits of licencee's address, whichever is greater. All antennae must be physically connected by wires to station txs and rxs.

EXCHANGE: RS(T) plus three-digit number starting at 001, continuing to four digits if necessary. Multi-tx stations must use separate numbers for each band.

SCORE: three points (20/15/10m) or six points (160/80/40m) for contacts with stations on different WAC continents and one point (20/15/10m) or two points (160/80/40m) for contacts with stations within same WAC boundary. QSOs with stations in same country are permitted for multiplier credit, but have zero points value.

MULTIPLIER is total number of prefixes worked on all bands (each prefix counted once only regardless of the number of different bands on which it is worked).

FINAL SCORE is total QSO points X total multipliers.

LOGS must show times in UTC, breaks and prefix multipliers first time worked. Logs should be checked for duplicates, correct points and multipliers. They should be accompanied by a sorted alphanumeric list of prefix multipliers and a summary sheet showing call, name, address, category, power, scoring information and a signed declaration that all contest rules and radio regulations have been observed.

SEND LOGS by disk. CT's *.bin file or *.all file; N6TR's *.dat file; NA's *.qdf file or *.dbf files are preferred. ASCII file containing all information is acceptable.

Disk files must be in chronological order for single operator and multi-single stations and chronological order by bands for multi-multi stations.

Please label disks and name your files with call used (eg VK3DID.BIN or VK3DID.DAT). Disks will be required from top-scoring stations.

Send by 6 May (SSB) or 8 July (CW) to: WPX Contest, 76 N Broadway, Hicksville, NY 11801, USA. Indicate SSB or CW on envelope. Logs may be sent via e-mail to: n8bjq@ernet.com

To be eligible for AWARDS, single operator stations must show at least 12 hours' operation and multi-operators 24 hours' operation.

Single band entries showing points for more than one band will be judged multi-bands unless otherwise specified.

JOHN MOYLE FIELD DAY CONTEST 2000

Presented by Eric Fittock VK4NEF
18 - 19 March
0100z Sat - 0059z Sunday

Overview

1. The aim is to encourage and provide familiarization with portable operation and provide training for emergency situations. The rules are therefore designed to encourage field operation.
2. The contest takes place on the third full weekend in March each year and runs 0100 UTC Saturday to 0059 UTC Sunday. 2000: 18 - 19 March.
3. Contest is open to all VK, ZL and P2 stations. Other stations are welcome to participate, but can only claim points for contacts with VK, ZL and P2 stations.
4. Single operator portable entries shall consist of one choice from each of the following:
   a. 24 or six hours,
   b. Phone, CW or Open mode,
   c HF, VHF/UHF, All Band
5. Multi-operator portable entries shall be Open Mode and consist of one choice from each of the following:
   a. 24 or six hours
   b. HF, VHF/UHF, All Band
6. Home and SWL entries may be either 24 or six hours, Open mode, all band.

Scoring

7. Portable HF stations shall score two points per QSO.
8. Portable stations shall score the following on 6m;
   a. 0- 49 km, 2 points per QSO
   b. 50- 99 km, 10 points per QSO
   c. 100-149 km, 20 points per QSO
   d. 150-199 km, 30 points per QSO
   e. 200-499 km, 50 points per QSO
   f. 500 km and greater, 2 points per QSO
9. Portable station shall score the following on 144 MHz and higher:
   a. 0- 49 km, 2 points per QSO
   b. 50- 99 km, 10 points per QSO
   c. 100-149 km, 20 points per QSO
   d. 150 km and greater, 30 points per QSO
10. For each VHF/UHF QSO where more than two points are claimed, either the latitude and longitude of the station contacted or other satisfactory proof of distance must be supplied.
11. Home stations shall score:
    a. two points per QSO with each portable station
    b. one point per QSO with other home stations

Log Submission

12. Logs must be accompanied by a summary sheet showing: callsign, name, mailing address, section entered, number of contacts, claimed score, location of the station during the

contest, equipment used and a signed declaration stating "I hereby certify that this station was operated in accordance with the rules and spirit of the contest." For multi-operator stations, the names and callsigns of all operators must be listed.

13. Logs must be sent by mail no later than 24 April to: John Moyle Contest Manager, 108 Queensport Road, Murarrie, 4172, Australia. An ASCII copy on 3.5" disk would be helpful. Also logs may be sent by e-mail to: <esr@powerup.com.au> Logs sent by e-mail must include a summary sheet and declaration, but operator's name is acceptable in lieu of a signature.

Certificates and Trophy

14. Certificates will be awarded to the leading stations in each section. Additional certificates may be awarded where operation merits it. Note that entrants in the 24 hours section are ineligible fpor awards in the six hours section.
15. The Australian portable station with the highest CW score will be awarded the President's Cup.

Disqualification

16. General WIA contest disqualification criteria apply to entries in the contest. Logs which are ineligible or excessively untidy are also liable to be disqualified.

Definitions

17. A portable station comprises field equipment operating from a power source, eg batteries, portable generator, solar power, wind power, independent of any permanent facilities.
18. A equipment comprising the portable station must be located within an 800 metres diameter circle.
19. A single operator station is where one person performs all operating, logging and spotting functions.
20. A single operator may only use a callsign of which he/she is the official holder. A single operator may not use a callsign for which he/she is a sponsor except as part of a multi-operator entry.
21. A multi-operator station is where more than one person operates, checks for duplicates, keeps the log, performs spotting, etc.
22. A multi-operator stations may use only one callsign during the contest.
23. Multi-operator stations may use only one transmitter on a given band at a given time, regardless of the mode used.
24. Multi-operator stations must use a separate log for each band.
25. A station operated by a club, group or organization will be considered to be multi-operator by default.
26. None of the portable field equipment may be erected on the site more than 28 hours before the beginning of the contest.
27. Single operator stations may receive moderate assistance prior to and during the contest, except for operating, logging and spotting. Massive logistic support by clubs, etc, is totally against the spirit of the contest and may result in disqualification and, at the discretion of the Manager, may be banned from this contest for up to three years.
28. Phone includes SSB, AM and FM.
29. CW includes CW, RTTY and Packet.
30. It is not expected that any other modes will be used in the contest, but if they are they shall be classed as CW.
31. All HF amateur bands except WARC may be used. VHF/UHF means all amateur bands above 30 MHz. Note: on 6 m the region below 50.150 MHz has been declared a contest-free zone; contest CQs and exchanges must take place above this frequency. Stations violating this rule will be disqualified.
32. Cross-band, cross-mode and contacts made via repeaters are not permitted for contest credit. However, repeaters may be used to arrange a contact on another frequency, providing a repeater is not used for the actual contact.
33. Stations may make repeat contacts and claim full points for each one. For this purpose, the contest is divided into eight consecutive three-hour blocks. 01-04, 04-07, 07-10, 10-13, 13-16, 16-19, 19-22, 22-01 UTC. Repeat contacts may be made once in these three-hour blocks, providing they are not consecutive and are separated by at least five minutes.
34. Exchange RS(T) plus a three-digit serial number commencing at 001 and incrementing by one for each contact.
35. Portable stations must indicate that they are portable by sending their callsigns followed by "P", eg 569003P.
36. Multi-operator stations must use a separate log for each band and commence each band with 001.
37. Receiving stations must record the exchanges sent by both stations. QSO points will be on the same basis as Home Stations, unless the receiving station is portable.
38. For all stations, the period of operation commences with the first contact on any band or mode, and finishes six or 24 hours later
39. The Contest Manager's decision is final and no negotiations will be entered into.

ar

Jarrod Diggins, Harmonic of Mark VK3JMD and Sue VK3LSL, rag chewing on his Dad's IC-T7A. Amateur radio safe in the future's hands!

SPOTLIGHT on SWLing

by Robin L. Harwood VK7RH
5 Helen Street, Newstead Tasmania 7250
(03) 6344 2324 E-mail: robroy@tassie.net.au

Millennium erupts in Sunspots and Squabbles

I AM WRITING this in the second week of the New Millennium and propagation has been down due to Sunspots and a Solar Flare. However there has been enough to keep me listening. Of course, there are so many Asian stations on SSB all across the HF spectrum even under international broadcasting stations. Presumably most are pirates or unlicensed but as I do not have direction finding capabilities, I can only suspect that some are on the high seas. It is no use listing frequencies because they alter daily but you will easily hear them in the international aeronautical allocation between 8.8 to 9 MHz and between 10 to 11.5 MHz. They can be on either sideband and are mostly observed from 0900 UTC onwards.

Aftermath of Hijacking

On Christmas Eve, an Indian flight out of Katmandu, Nepal was taken over by a terrorist group closely linked to the separatists fighting for the integration of Indian controlled Kashmir into Pakistan. One person was murdered and the plane ended up on the tarmac of Kandahar in southern Afghanistan for a week. Negotiations over that period were extremely tense and in the end, the remaining passengers were released in exchange for three Kashmiri rebels held in Indian jails. The terrorists melted away and are believed to have gone into Kashmir. The three Kashmiri activists ended up in Pakistan.

One of them, a Muslim cleric, subsequently called for a Jihad or "holy war" against India. Naturally this has incensed India and a fierce propaganda battle has erupted over the airwaves and in the Press.

Also an irregular clandestine station – "Radio Free Kashmir" has reappeared just above the 90-metre tropical band allocation on 5101 kHz on AM. It has been widely heard across South Asia and is on from 1300 to 1330 and again from 1335 to 1400 UTC. Although it is reported using at least 10 kW, reception here in southern Australia is extremely difficult because AXM located in Canberra is using 5100 kHz for radiofax weather bulletins on behalf of the Bureau of Meteorology in Melbourne. Although the FAX transmissions are not continuous, the sender is transmitting a carrier when there are no pictures.

Voice of Russia blasts Chechen "bandits and terrorists"

As you are aware, Russian troops re-entered this Trans-Caucasian region in September 1999 to fight what they termed "bandits and terrorists". In 1996, Russian troops were forced to withdraw, granting semi-autonomous status to the region. However the Chechens regarded this as independence from Moscow, although no other nation recognized them. The region quickly degenerated into anarchy with no central administration. Many warlords quickly began fighting amongst themselves as well as with the Russians, kidnapping anybody and holding them for huge ransoms to finance their arms acquisitions.

One callsign, REA4, is believed to be the Russian Air Force with traffic, disguised as METEO bulletins. I have heard it here, close to the band edge on 7 MHz

Terrorist cells became active within the Russian Federation and were blamed for several explosions in many cities across Russia with heavy casualties.

In September Russian troops were fighting incursions from Chechen warlords into a region close to the border with Chechnya. The aim was to establish an Islamic state there similar to Chechnya.

The Chechens were driven back across the border. The Russians followed and now have a substantial amount of Chechnya under military control. But they have not yet completely gained control of the capital of Grozny. Fierce hand to hand combat for control of every remaining building is happening with heavy casualties of both military and civilian personnel.

Chechen fighters are going to be almost impossible to eradicate because they will hide in the mountainous areas of the Caucasian ranges, mounting hit and run guerilla raids.

The official "Voice of Russia" in Moscow has been putting the Russian viewpoint after American, European and some Islamic opposition to the Russian operation. The Chechens have not been heard.

However Russian forces are still extensively using HF radio, despite their satellite technology. Also Cyrillic MORSE with alphanumeric ciphers has been monitored. One callsign, REA4, is believed to be the Russian Air Force with traffic, disguised as METEO bulletins. I have heard it here, close to the band edge on 7 MHz.

Boris Yeltsin's unexpected resignation on New Year's Eve, Vladimir Putin's elevation to acting President and the resulting election on 25th March, should also be interesting listening over the "Voice of Russia".

This station has been broadcasting since 1929 and now is once more firmly reflecting the official Moscow policy Moscow is best heard here on 21790 at 0700 UTC and on 9905 at 1900 UTC. Strangely, Moscow is a hard catch these days, compared to being extremely easy to hear only 10 years ago.

Civilian ALE increases security and reliability

HF users are increasingly utilizing a new mode. It is known by the acronym of ALE – Automatic Link Establishment. It operates on a selection of random frequencies and transmitters. A sounding burst is sent and

the receiving station will acknowledge. No one channel is exclusively used and is similar to trunking techniques.

It has increased security and also can take into account interference and propagational anomalies. ALE was in the exclusive domain of the US military but now has been released to the civilian sector, requiring increased security and reliability.

ALE is like a watery bubbly sound. It is designed to fit in the AF passband of a normal SSB signal. It consists of 8 tones (MFSK). They are located 250hz apart from 750hz to 2500hz. The centre of the system is at 1625 Hz. Each tone is 8mS in duration. This gives 125 symbols per second. With 8 tones (symbols or elements) it can support 3 data bits per symbol. This results in a transmitted data rate of 375 bits per second. It is a robust system and employs a system of triple redundancy in the transmission of ALE data, by interleaving the data, and by use of Golay forward error correction (FEC).

The ALE system is designated Mil.Std 188-141A. As I previously stated, it is increasingly being used by Government agencies and diplomatic personnel outside of the United States. Although hobbyists have written decoder programs, we can rightly assume that it still quite sensitive. Although ALE has been around for a few years, I first really noticed it on top of a China Radio International frequency. CRI has a habit of transmitting on odd channels anyway. These ALE pulses were on 7620 kHz. However due to the random nature of these ALE transmissions, no time frame can be accurately given. I have absolutely no idea where they are coming from yet they can be sometimes very strong.

I shall be changing my Internet Service Provider and you can use robroy@elaunceston.com in the interim. I will have my new e-mail address next month. 73 de VK7RH

ar

An On-Air Czech

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Beenleigh 4207

Here is my contribution to your appeal for interesting QSOs.
I applied for my first licence on OK land in 1967. Exams were no problem as I was the holder of a first class military certificate. Those days the licensing body was, believe or not, an institution named, "Union for cooperation with the army". To become a member one had to sign a claim "I will love the Soviet union forever"! The same applied for membership in motoring and other clubs.

One day I received a phone call from a comrade major who managed to dig out something politically unsound in my past. My short fuse went off and I recommended that he roll up my licence and stick it, well you can imagine where... Then I sent him to hell and crushed the telephone. So, that was the end of my ham career for the first eight years. I was happy to be allowed SWLing, like many others in OK let alone by the Soviet Union. But nothing lasts forever and one day the licensing was handed over to the Department of Communications That was the body I used to work for as an overseas telegraph operator so my licence OK1AXM was in my drawer in a few days.

D day was 1 March 1975. I was waiting with my new homebrew rig - one watt of input power on the 80m band, plus a G5RV one could almost touch with a broomstick, SWR unknown, and a bottle of rum was waiting to celebrate my first QSO. At midnight sharp my CQ went on the air with the callsign OK1AXM/p - the celebration of 30 years of liberation by the red army. Not expecting anything, a shock was there. UA9CM, some 4000km. Not bad, eh, but there was better to come. The required number of contacts for licence upgrading was soon in the log so an all new rig was built quickly. When the solid state part was almost ready up to the pre-driver stage I could not resist trying it on the air so I called a JA station on 14MHz and we had a no-problem QSO. The input power was 250 milliwatts, there was only a choke in the collector and the (also unfinished) 2 element Yagi with SWR well in the red was beaming west, one of two most impossible directions.

Another good QSO was OK to UB5, 579 both ways with the coax feeder disconnected and well spaced from both arms of the dipole after a storm.

And just one from VK land, where everything is easy, Sydney - Brisbane QSO with VK2BQQ. My antenna was 20m of wire, his the GUTTER. Nothing special? Well try it on 160.

NOVICE NOTES

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Making the most of Cycle 23

You've read about the sunspot cycle in the text books - how it peaks approximately eleven years, and how more sunspots mean more ionisation and better HF propagation. Well, according to the pundits, 2000 is when it all happens and Solar Cycle 23 reaches its peak. This article tells how you can maximise your enjoyment of the coming years of high solar activity and good HF conditions.

What to expect

More of HF will be open longer. In low sunspot years 20, 15 and 17 metres go dead at night. When sunspots are high these bands remain open well after dusk. 10 and 12 metres, which open only briefly in low sunspot years, will provide international (DX) contacts almost daily. In peak years, 20 metres becomes almost a 24-hour DX band. The skip zones on 30 and 40 metres shorten with higher sunspots, making them reliable for short and medium distance intra and inter-state communications. Figure One is a log extract of the type of HF contacts that are possible when conditions are good. They were made with 80 watts and a ten metre-long vertical wire antenna from a noisy, high-density suburban location.

Six metre buffs also get excited during the high part of the cycle. Whereas you almost need to make a phone call to get a contact on six in the low years, on high-sunspot days the band bustles with DX. On particularly good days, the best six metre stations have contacted Europe, while operators running as little as one watt CW into makeshift antennas have worked into Japan.

Propagation paths change when sunspot numbers rise. It is normal for north-south paths (eg between Australia and Japan) to be open longer and later than east-west paths (eg to Europe or Africa). In sunspot years, most contacts made on 10 and 15 metres tend to be with Asian stations. However as the bands improve, a wider variety of locations, such as Europe and North America become workable on these bands.

Sunspot cycles rise faster than they fall. In an eleven year cycle, it may take four years to reach the top from the trough of the previous cycle, and six or seven years to get to the bottom from the top. This is good news as it means that though this cycle is expected to peak in a few months time, excellent HF conditions will remain for about the next three years. Figure Two shows observed and predicted sunspot numbers for Cycle 23.

Photo 1: In high sunspot years, long distances can be worked with low transmit powers. Pictured is a 5-watt CW transceiver for 40 and 20 metres.

High solar activity is not all fun and games - conditions can be very volatile. When sunspot numbers are high, solar flares become more frequent. After a severe solar flare the bands may go dead, and you may wonder if your rig still has an antenna connected to it.

Preparing for the coming cycle

When conditions are good, and you're on the right frequency at the right time, almost anyone can work DX. However, the higher HF bands are more fickle than bands such as eighty, two metres and seventy centimetres. Follow the four steps below to maximise your success.

Step One - Obtain information about solar activity and DX propagation.

Many amateurs enjoy working anyone anywhere. They might be testing a new antenna, seeing how far their low-powered signal will go, or just enjoy chatting to people. For these people, planning their operating is often merely a matter of tuning around and finding a band that's open.

Others specialise in working a particular part of the world, perhaps to gain points for an award, for a DX contest or to practice a language. For these people, success requires a more rigorous approach.

The first step is to find out the right frequencies and times for contacts to a particular location. Such information is provided in the prediction charts elsewhere in this magazine. Propagation charts are only a guide as conditions vary from day to day - one day, signals might peak at 6pm, the next day they might reach their strongest at 7pm.

Updates on solar activity are given on the WWV time and signal station. These are broadcast at 18 minutes past the hour on 2.5, 5, 10, 15 and 20 MHz. Near real-time propagation information also provided on

various websites, some of which provide maps showing maximum useable frequencies by region and the progress of the 'twilight zone' around the globe. A search on 'Cycle 23', 'sunspots' or 'radio propagation' should reveal plenty of sites on the topic.

Computers are powerful tools for radio propagation forecasting and analysis. Programs that provide details of likely propagation given a particular set of solar conditions are available. A good way of testing them is to make use of the worldwide network of International Beacon Project (IBP) beacons on the higher HF amateur bands. IBP beacons share a single frequency on each band and are time-sequenced so that only one is transmitting at any given time. They transmit on 14.100, 18.110, 21.150, 24.930 and 28.200 MHz. IBP beacons initially identify at 100 watts and then drop power to 10 watts, 1 watt and then 100 milliwatts - a useful feature that allows one to quickly check band conditions.

Step Two - Erect antennas for the higher HF bands.

You'd be surprised how many amateurs own do-everything multiband transceivers,

continued next page

Date	UTC	Freq	Mode	Station	RST sent	RST rec
29/8/99	0655	14·220	SSB	LA7YX	56	55
	0705	14·180	SSB	IK2VFR	57	59
	0710	14·255	SSB	9A4RX	58	57
	0725	14·120	SSB	F2SY	56	55
	0739	14·220	SSB	PA3GYM	47	5
	0745	14·225	SSB	GM4FDM	57	57
	0800	14·180	SSB	G4YYD	55	44
	0825	21·325	CW	JA5HJ	579	559
	0845	21·270	SSB	JQ1LOI	57	54
	0905	21·260	SSB	JA8VJ	57	55
	0910	21·260	SSB	VK3FLI	34	5

Figure 1: A night of DX. The log extract is an example of what can be worked on HF when sunspots are high and conditions are good. All contacts were made with approximately 80 watts to a 10 metre-long wire vertical antenna.

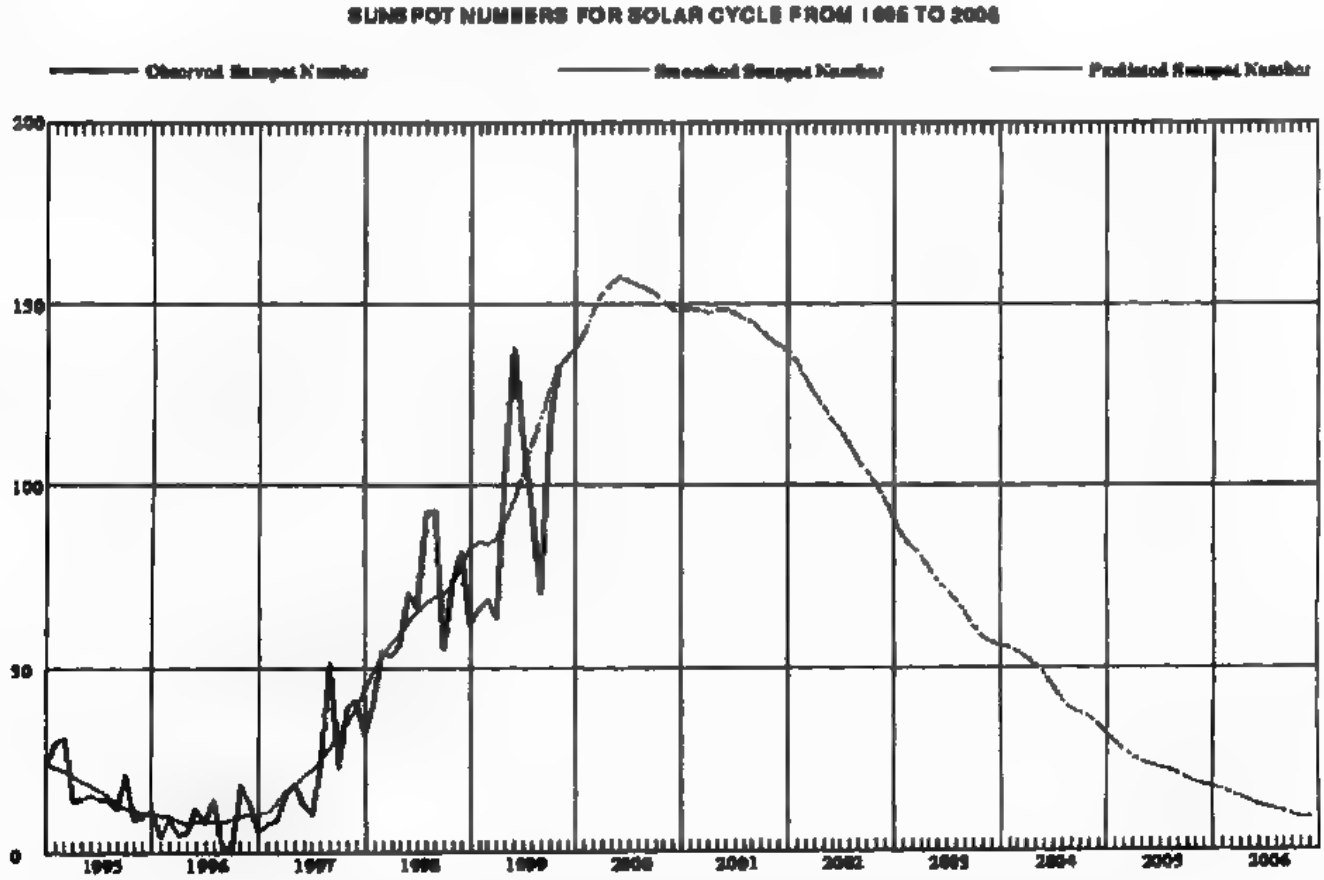

Figure 2: Progress of Cycle 23 to December 1999. Note the large month-to-month variations in sunspot numbers. Source: IPS website (http://www.ips.gov.au/asfc/current/sunspot.gif)

but miss out on many bands for the want of five dollars' worth of wire stuck up in the air. Dipoles, ground planes or half-wave verticals will get you started and can provide worldwide contacts at times.

If you like a particular band, erect a directive gain antenna, such as a yagi or quad. Such antennas can either be rotatable (usually made of telescoping aluminium tubing) or fixed direction, with wire elements slung between well-located poles or trees. Gain antennas have the following advantages compared to dipoles and verticals:

- Clearer reception. Gain antennas can usually be rotated to null out interfering stations coming from the rear or side.
- Stronger signals at the other end. A station using a three element yagi and a 100 watt transmitter should sound as strong as a 400 watt transmitter feeding a half-wave dipole.
- Longer operating periods possible. A low gain antenna will provide DX contacts in the middle of an opening. However, at the beginning or end of openings, people with dipoles often find it hard to make themselves heard. A gain antenna allows contacts during these marginal conditions, thus extending the period that stations can be worked.
- A greater variety of stations become workable. The author has found that when using low power and simple antennas the majority of DX stations worked had quite large antennas, such as five or six element yagis. As conditions improved, a more contacts were with people using smaller antennas, such as two or three element yagis. Improving your antennas makes reception easier and therefore aids contact with stations who may be mobile or running low power.

Not everyone can erect towers stacked with beams. Even if you're restricted to verticals or dipoles, there's plenty of things that you can do to improve your signal at the other end. These include:

- Raise the height of your dipole. Most radiation from low dipoles goes straight up, rather than towards the horizon. This is fine for local contacts on 80 and 40 metres, but poor for long distances. Greater antenna height allows more radiation at angles close to the horizon, permitting longer distances to be covered. Increasing you antenna's height from five to ten or (better still) fifteen metres is one of the most cost-effective improvements to your station that can be made.
- Use elevated verticals with above-ground radials. Vertical antennas with buried radials require many radials to perform efficiently, especially in areas of poor soil conductivity. Installing vertical antennas on a support pole several metres high and using above-ground radials allows good performance with only a few radials.
- Use verticals that are less dependent on ground systems. If installing radials is difficult, consider a half-wave vertical. Compared to quarter-wave ground plane antennas, half-wave vertical antennas (such as the famous CB Station Master antenna) can be highly efficient with a minimal ground system. The extra height will help too!
- Consider fixed-wire beams. If you're mainly interested in one direction, wire beams strung up in trees can provide low-profile antennas capable of top performance. A two-element wire yagi can be slung between four well-placed trees, while a two element quad for ten or fifteen metres can be concealed in the canopy of a single tree.
- When all else fails, operate portable. Most Australians have ready access to open spaces, whether in the hills or by the coast. A simple inverted-vee or vertical antenna can yield outstanding results, especially if installed in an over-water location, such as on a boat or pier.

Step Three - Know your station

Once you have some antennas and know the right times and frequencies to try, the next step is to assess if your station is capable of exploiting the propagation available. A full assessment is beyond the scope of this article, as it requires an advanced understanding of wave propagation, antenna gain, radiation angles and receiver noise. However, the following example should succeed in explaining the desirability of having reasonable expectations based on what propagation can provide.

After looking at propagation charts or a computer program you may conclude that 40 metres may currently be open to the US. Turning on your receiver may reveal strong signals from North America. However a full assessment (as mentioned above) is likely to disclose that expecting frequent North American contacts with five watts and a low dipole is unrealistic. You would get very disappointed very quickly if you were expecting regular contacts with North America using that dipole.

On the other hand, if your ambition is simply to span the Pacific occasionally with low power and are using an efficient, low-angle antenna (such as a high dipole or vertical) there is no reason why you cannot achieve your aim with a little persistence. The lesson here is to set reasonable objectives, and design your station so it can meet them.

Step Four - Polish your operating technique

You may have a good station and antenna installation, but will not be able to use it to its full potential unless you can properly adjust and operate your equipment.

- Set your transceiver up correctly. Excessive microphone gain can cause over-modulation and interference to other band users. Poor earthing gives rise to RF feedback, microphones that zap your lips and rough-sounding audio. A quarter wavelength wire connected to the transceiver's metal case usually fixes these problems where a proper RF earth cannot be installed. Speech processing can raise the intelligibility of your transmission when signals are weak, but too much causes distortion and excessive pick-up of other noises in the shack. A power supply that is too small or poorly regulated causes 'FMing' on SSB and chirp on Morse.

People prefer to answer calls from stations with clean signals, and quality signals penetrate through interference better. See your transceiver's instruction manual for more detailed guidance on adjusting your particular rig.

- Tune around the bands for DX. You'll hear nothing if you're not listening. To learn which bands are open to which places, spend 20 or 30 minutes at various times of the day to tune across the various bands. Note the locations of stations heard on each band and correlate this to the time of day. You don't always have to wait for the station to give his exact location - listening for the callsign prefix and looking up the country in the WIA Yearbook is usually good enough.

After a while you will observe both certain consistent patterns of propagation (eg many strong European stations in the late afternoons on 20 metres) and significant day-to-day differences in conditions. Don't overlook the IBP beacon frequencies (given earlier) in case there is propagation but no activity.

- Use various means to gain contacts. There are several ways to get contacts.

These include calling CQ, answering someone else's CQ, or calling one of the stations involved in a contact that has just finished ('tail-ending'). The latter is particularly effective as you know the band is open and there is a good probability that someone is still listening. When tail-ending, the main thing to watch is to ensure that all parties have properly signed before you call. This is not always easy - sometimes people take five minutes to say 73, may sign off several times and do not always end their contacts cleanly. Count to four or five, and if nothing heard, make your call.

One benefit of being in Australia is that when working DX (eg Europe, Japan, North America), there's many more of them than of us. This works to our advantage in several ways. Firstly, it makes overseas stations eager to work VK. Secondly, if you are calling DX stations (whether answering a CQ or tail-ending), the competition from other VKs/ZLs who may also be calling is relatively light.

Know when to call people I have often heard people whose signals should have been heard, but have missed out on contacts because they timed their calls poorly. They may have been calling while a previous contact was still signing off, or called at the same time as several others. If dozens of stations are calling a particular station, it is likely that he is unable to pick out an individual callsign. It can sometimes be worthwhile to insert your call as soon as the melee dies down. With any luck the DX station will hear you, not because you were the strongest, but because you timed your call best. At other times, DX stations may be tuning up or testing. It sometimes pays to give them a quick call before they call CQ and the multitudes find them. Timing is very important. It can't be taught, but can be learned through regular on-air activity, and observing what works and what doesn't.

- Put out calls if the band appears dead. People will not know if the band is open if no one is using it. It's up to you to activate the band by putting out a call. These days this doesn't mean endlessly pounding the key or calling into a microphone. Cassette recorders, digital voice recorders and even computers can be set up to call CQ automatically, especially if your rig has VOX (voice operated transmit) facilities Always be in attendance to answer any calls - there's nothing worse than trying to answer someone's unattended CQ caller!

Should I upgrade?

If you have a Novice Limited licence, Cycle 23 will be a non-event if you don't upgrade to at least Novice. If you don't act now, you'll need to wait another decade before you can take advantage of the next sunspot peak.

Limited licencees are a little better off. They have six metres all modes and ten metres FM. However, as the saying goes, six metres is not just a band - it's a way of life. You can spend days by the transceiver, and not hear a thing. Then after returning from a short absence, you're told you missed the biggest, greatest six metre opening there ever was! Six is like that - it waits for no one. 29 MHz FM is also fickle, and is markedly inferior to SSB when signals are weak.

To really take advantage of Cycle 23, Novice is an absolute minimum grade you should aim at. Intermediate grade is also worthwhile, because of the extra frequencies it provides on the 3.5, 21, 28 and 50 MHz bands.

As conditions decline, around 2002-2003, ten and fifteen metres will open less time each day. Twenty metres will once again become the main DX band. An unrestricted licence is particularly desirable in Intermediate and low sunspot years because of the 20 and 40 metre privileges it provides. Access to the 12, 17 and 30 metre bands is also useful, especially when 20 metres is very crowded.

If you've just completed licence study, it is desirable to obtain your AOCP as soon as possible, while the knowledge and Morse is still fresh. If you've had a Novice or Intermediate licence for some time, and have to make a choice between studying and operating, I would suggest you enjoy the next couple of years on the air and obtain your Unrestricted when conditions start to decline and the middle and lower HF bands become more useful.

Conclusion

This article has, I hope, provided an introduction of what to expect from Cycle 23 and how you can take advantage of it. Many amateurs' most memorable contacts are made in high sunspot years such as this one. Prepare your station and make sure you get a fair slice of the action in the years ahead.

References and further reading

1. Weiss, A The Joy of QRP - Strategy for Success, Milliwatt Publications, 1984
2. ARRL Handbook, various editions
3. Moxon, L HF Antennas for All Locations, RSGB, 1982
4. ARRL's Wire Antenna Classics, ARRL, 1999
5. IPS website http://www.ips.gov.au

ar

REPEATER LINK

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HF-Gateways may be permitted on some lower HF bands

At the last WIA/ACA Liaison meeting in December, promising indications that HF-Gateways may be permitted on some lower HF bands such as 40 metres. The detail still needs to be sorted out but a license application will be submitted soon from VK6 for a 2 metre FM to 40 metre SSB gateway. This application should speed up the process. Thank you to the WIA Liaison team, who were able to make progress on this new concept.

One other point of interest in the voice repeater scene that came out of the Liaison meeting was that there is no limit on the number of voice repeaters that can be linked. The information on the ACA web page is incorrect.

Well done, Eric VK5LP

Having put this column together for over ten years, and at times finding the time to do so difficult, I can but applaud Eric Jamieson, VK5LP for his regular column in AR magazine. I dusted off the earliest copy of AR that I could find, August 1971 and read Eric's column written some 29 years ago. Of particular interest to me was that the WIA had a Repeater Secretariat way back then, the activities of which Eric reported on. I gather FTAC (John Martin) and the Divisional TACs perform this function now, but I must find out a bit more about this long gone position.

Eric started the VHF column long before computers made the task easier and his column required a lot of detailed input from a large number of sources. Well done Eric. I doubt that I have the energy to put in the years you have.

Perhaps an article on how you did it every month for all those years please Eric

Back on air after some good advice

Our 29 MHz simplex gateway in VK6 has been off air for a couple of months. The transmitter slowly lost power and eventually stopped all together. Eventually I found the time to pull the transmitter apart. After a bit of exploration the fault was tracked down to the PA output low pass filters. One of the ferrite toroids was black and had been very hot. Rewinding the toroid and replacing some of the mica capacitors produced some output but not the full 100 Watts. Advice from Clive VK6CSW, that ferrite cores can change their properties if heated, proved to be the problem. A replacement core and the transmitter is back on air. Worth remembering that heating ferrite cores can destroy their magnetic properties.

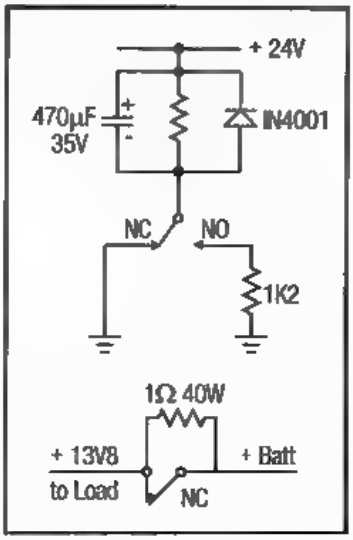
While on the topic of 29 MHz gateways, more systems are planned, and one line of thought is to have them all on the same frequency of 29.120 MHz. The reason being that once we are able to remove the no linking below 50 MHz regulation they can link together. In order for gateways to be on a common frequency on 29 MHz, a CTCSS tone would be required on the 29 MHz transmissions so, other 29 MHz gateway receivers can use the tone to prevent linking. So for the moment the extra circuitry is required to prevent linking between gateways. Once the regulation is removed the CTCSS tone can be removed or perhaps used the other way around so gateway receivers don't receive pirate activity. Gateways would only link between those gateways with the CTCSS tone.

More next month on this topic with some thoughts on what tone frequency to use. FTAC is floating 67 Hz as a discussion point.

Erratum: Modfying a Linear Power Supply to Charge Gel Batteries

by Warren Stirling VK3XSW
January 2000, page 26

We regret that a drawing showing how a relay is to be connected into Warren Stirling's VK3XSW project was accidentally omitted from the text and is now reproduced. Perhaps you should update your January copy now.



Capacitor charges when DC applied, dumps charge into coil when contacts open to keep relay operating to NO position where resistor provides hold current to coil

On power fail relay drops out and shorts 1Ω current limit resistor

On power restore relay operates and battery charged via current limit resistor

IONOSPHERIC UPDATE

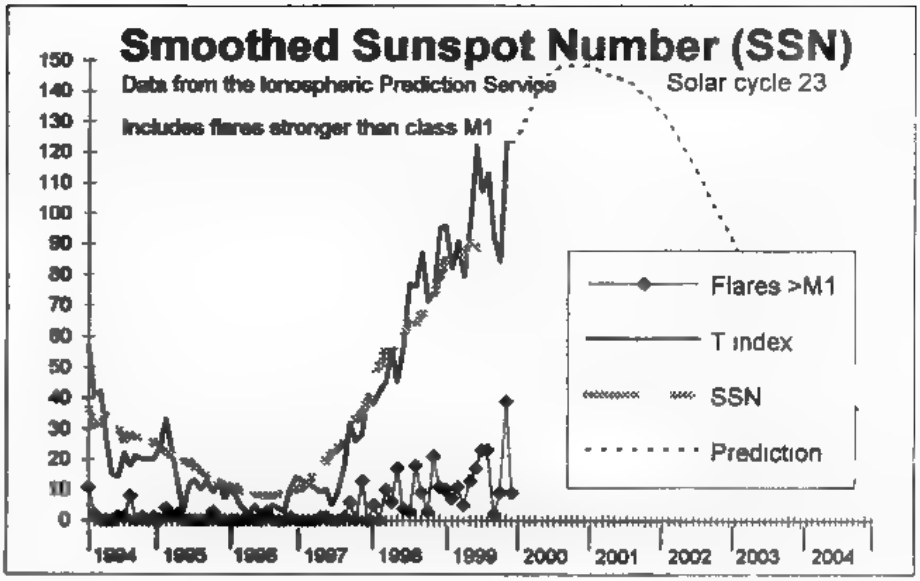
Current solar cycle

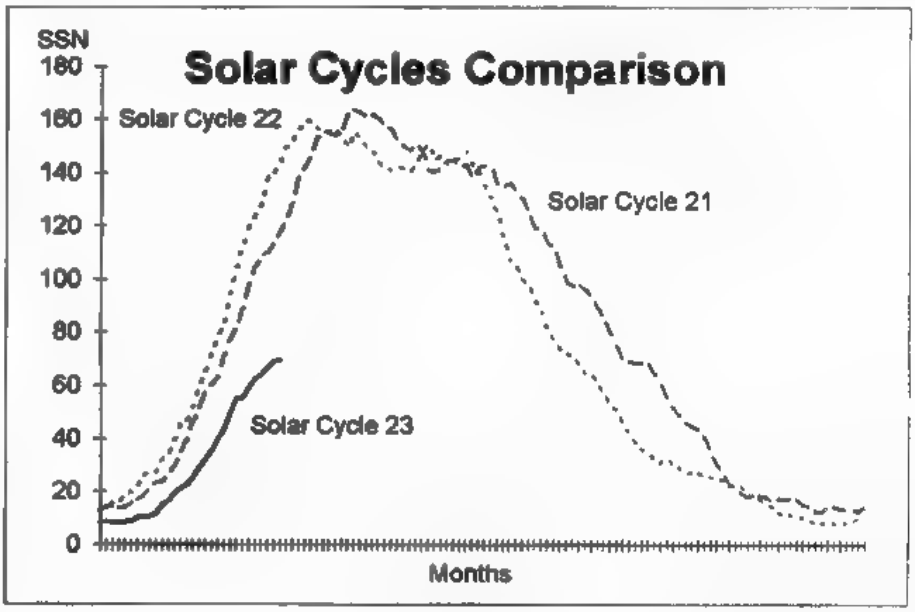
A graph comparing the last three solar cycles is again included this quarter. The different shape of the current solar cycle is now more evident. Note the fall off in the rate of increase when compared to the previous two cycles. While the current cycle is not as great, it should be remembered that the last two cycles were exceptional. As more data comes in, the Ionospheric Prediction Service has been revising the T index table used to make our published HF Predictions. These revisions have invariable been down.

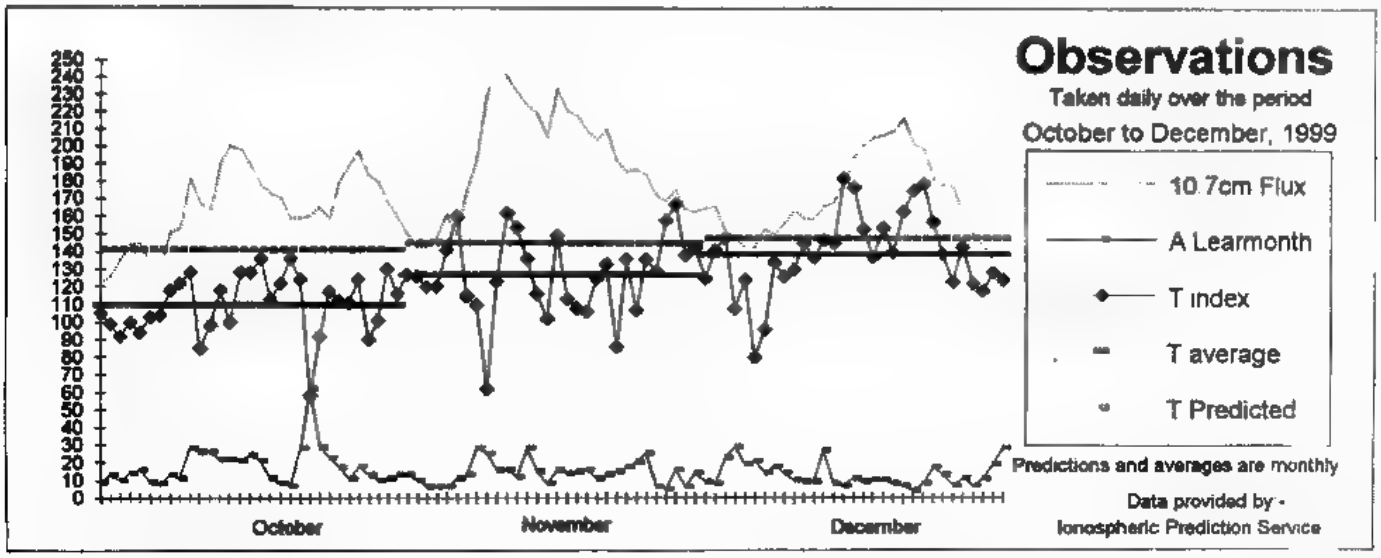
It is still expected that the current solar cycle (23) will reach its maximum level this year. Remember that the smoothed sunspot number is an average over a year and so is by nature six months behind. The comparison graph is purely smoothed sunspot number; it does not include predictions.

While the Ionospheric Prediction Service published table is for a predicted maximum smoothed sunspot number of 166 in April 2000, this too may be revised. My understanding is that the predicted smoothed sunspot number table comes from the Solar Environment Committee of NOAA where any revision is considered.

But propagation is opening further as evidenced by the TEP openings now occurring for amateurs in the northern areas of VK4 and VK8. The best is yet to come. Whenever the maximum in the smoothed sunspot number cycle occurs, my experience is that radio activity via the ionosphere has always been best in the years after that maximum. It is as if there is some inertia between theory and practice.







HF PREDICTIONS

by Evan Jarman VK3ANI
34 Alandale Court, Blackburn Vic 3130

These graphs show the predicted diurnal variation of key frequencies for the nominated circuits.

These frequencies as identified in the legend

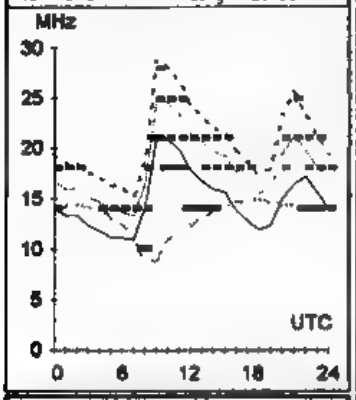
- Upper Decile (F-layer)
- F-layer Maximum Useable Frequency
- E-layer Maximum Useable Frequency
- Optimum Working Frequency (F-layer)
- Absorption Limiting Frequency (D region)

Shown hourly are the highest frequency amateur bands in ranges between these key frequencies, when usable. The path, propagation mode and Australian terminal bearing are also given for each circuit.

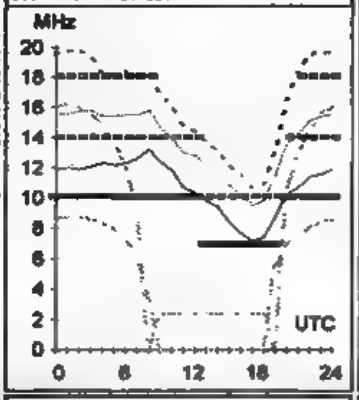
These predictions were made with the Ionospheric Prediction Service program: ASAPS version 4.

February 2000
T Index: 130

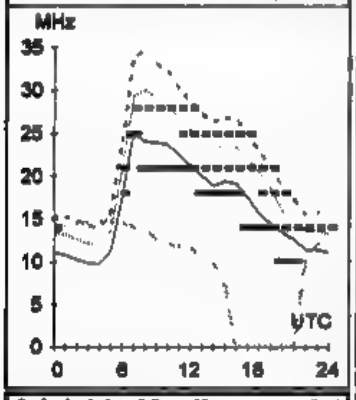
Adelaide-London 132
First F 0-5 Long 23755 km



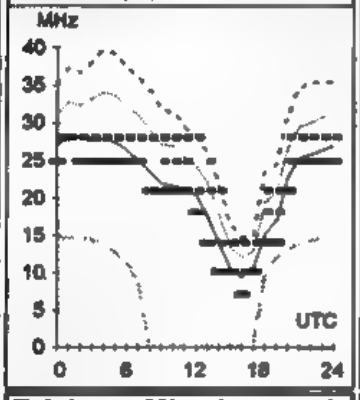
Brisbane-Dunedin 148
Second 2F19-26 2E5 Short 2560 km



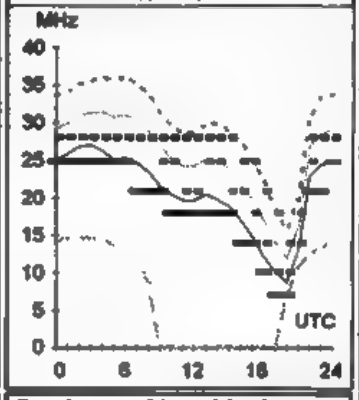
Adelaide-London 312
First F 0-5 Short 16269 km



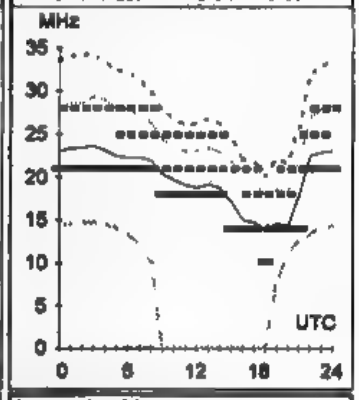
Brisbane-Honolulu 49
Second 3F5-12 3E0 Short 7569 km



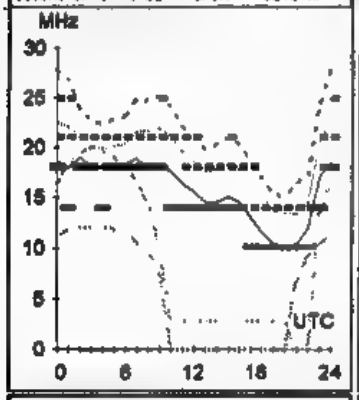
Canberra-Tokyo 352
Second 3F4-10 3E0 Short 7948 km



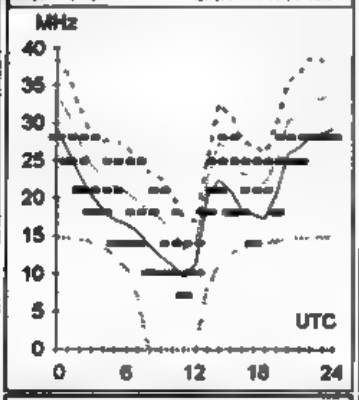
Darwin-Auckland 130
First 2F 5-9 2E0 Short 5136 km



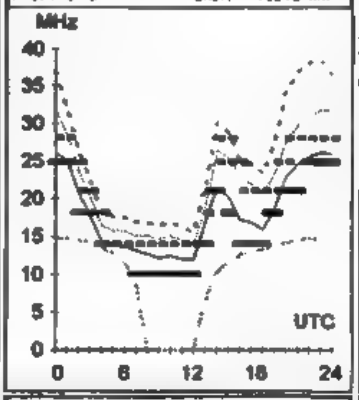
Adelaide-Manila 338
Second 3F10-19 3E1 Short 5813 km



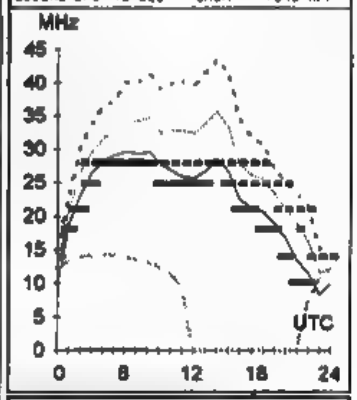
Brisbane-Miami 79
First F 0-5 Short 14761 km



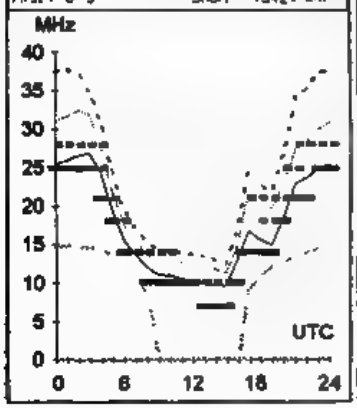
Canberra-New York 68
First F 0-5 Short 16218 km



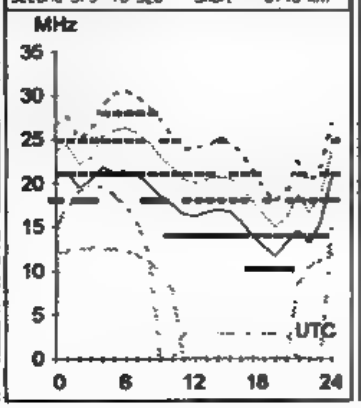
Darwin-New Delhi 309
Second 3F6-13 3E0 Short 7345 km



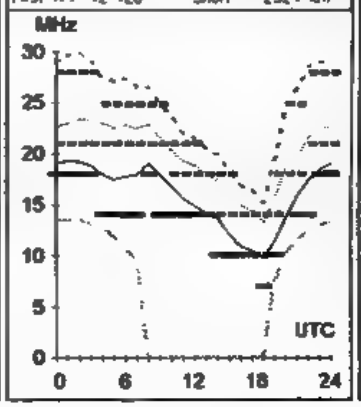
Adelaide-Vancouver 49
First F 0-5 Short 13421 km



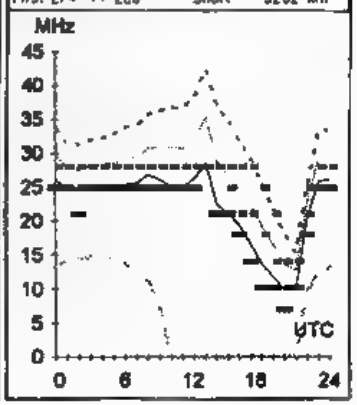
Brisbane-Singapore 293
Second 3F9-16 3E0 Short 6146 km



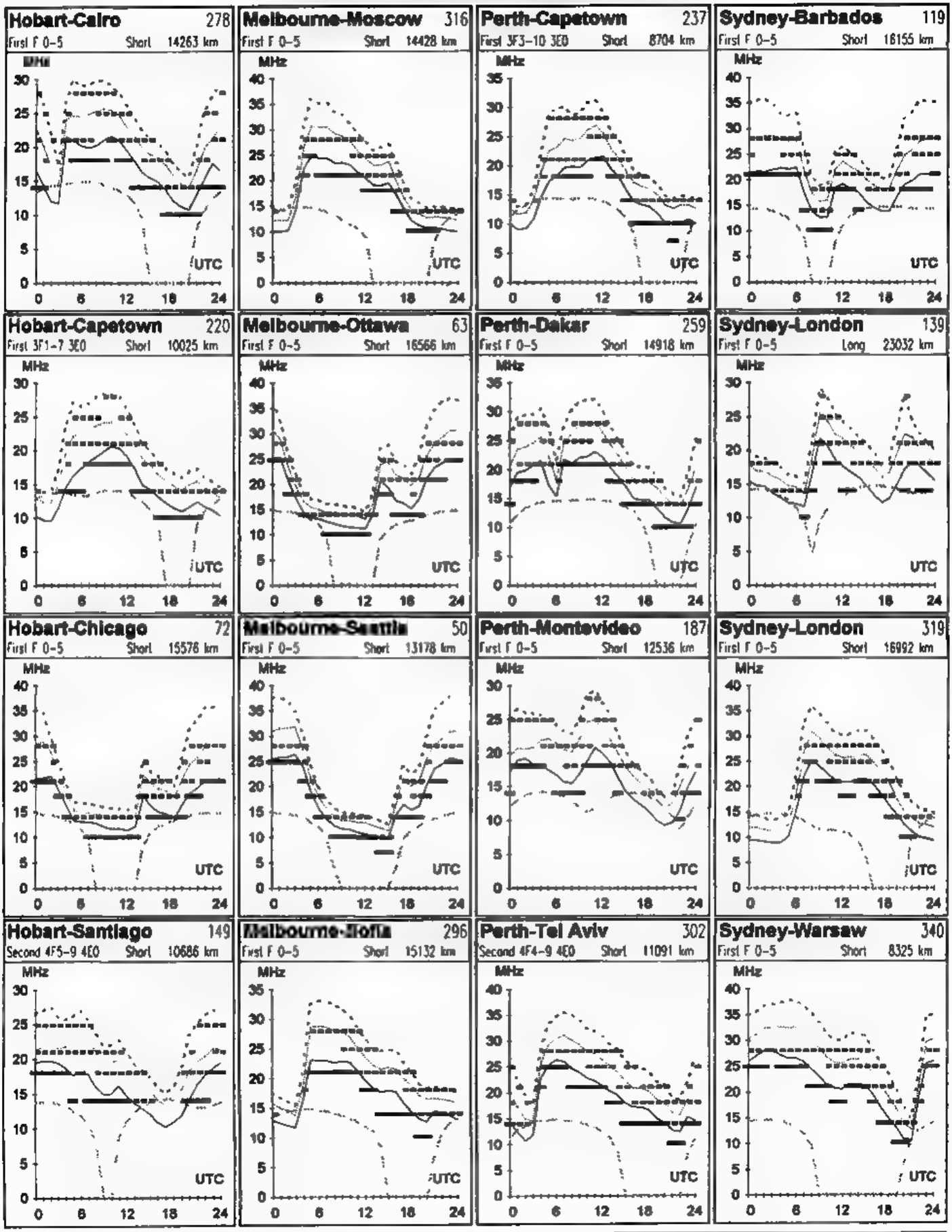
Canberra-Wellington 115
First 1F7-12 1E0 Short 2324 km



Darwin-Osaka 5
First 2F4-11 2E0 Short 5262 km



HF Predictions



HAMADS

- Hamads may be submitted on the form on the reverse of your current Amateur Radio address flysheet. Please print carefully, especially where case or numerals are critical.
- Please submit separate forms for For Sale and Wanted items, and be sure to include your name, address and telephone number (including STD code) if you do not use the flysheet.
- Eight lines (forty words) per issue free to all WIA members, ninth and tenth lines for name and address. Commercial rates apply for non-members.
- Deceased estates Hamads will be published in full, even if the ad is not fully radio equipment.
- WIA policy recommends that the serial number of all equipment for sale should be included.
- QTHR means the address is correct in the current WIA Call Book.
- Ordinary Hamads from members who are deemed to be in general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being re-sold for merchandising purposes.
- Commercial advertising (Trade Hamads) are pre-payable at $25.00 for four lines (twenty words), plus $2.25 per line (or part thereof), with a minimum charge of $25.00. Cheques are to be made out to: WIA Hamads.
- Copy should be typed or in block letters, and be received by the deadlines shown on page 1 of each issue of Amateur Radio, at:

Postal: *Newsletters Unlimited, 29 Tanner Street, Richmond, 3121*
Fax: *03 9428 4242* *E-mail: news1@webtime.com.au*

Please only send your Hamad once
Please send Hamads by mail OR fax OR email (much preferred).
Please do not send by more than one method for any one ad or issue, it is confusing.

FOR SALE ACT

•KLM KT-34A 4 el Tribander Yagi, with set of brand new Capacitor Caps, Boom Length 4 88m, rated at 4KW, good condition, VK1TX Tex, Ph (02) 6296 2508 or M 0413 139151.

•Vertical antenna 5 band 10-15-20-40-80m Comans, $150 VK1LD Les (02) 6247 5660 QTHR.

•Yaesu FT DX 401 SSB transceiver. High power, super sensitivity and sharp selectivity in one complete station package. Get on the air for $175 00 Ed VK1NBH (02) 6251 2312 or email gudruned@effect.net au

FOR SALE NSW

•Txcvr Europa One SSB 12 CH xtal cont HF with 24v PS of two IC-PS15 in series and "Q" match ant. coupler $200 + P & P ono. •Yaesu 2 input speaker SP102 with filters S/N 070259 $25 + P & P •Yaesu desk mic YO148 Dynamic 600Ω — 50kΩ $25 + P & P ono QTHR (02) 6495 9707 VK2GBM Laurie

•Kenwood TS830S HF Trsvr SN 2042198 with AT20 Antenna Tuner SN 3019402 and MC30S Microphone $ 625 •Yaesu FT 290R SN 3F281064, YMA7 Microphone, Mirage B23G, SN 8751073 and Power supply Panther $350 All in original boxes with service manuals. VK2KGX QTHR (02) 9525 9473

•BOOK "Radiotelegraph and Radiotelephone Codes, Prowords and Abbreviations." 2nd Edition. $16 posted Australia. 90 Pages. Q,X,Z Codes, 97 Phonetic, 20 Morse Codes. Phillips, Myer, 10,11,12,13 Codes. Much other info. Internet http://www.nor.com.au/community/sarc/phonetic.htm. VK2JWA, John W.Alcorn. QTHR. 02-66215217 jalcorn@nor.com.au

•INTERNET Connect from Port Macquarie to the Gold Coast from 80c per hour. Summerland Amateur Radio Club. For info - http://www.nor.com.au/community/sarc/sarc.htm. Harry VK2XIO, QTHR, cascom@nor.com.au. PO Box 293, Lismore, 2480. Ph (02) 6621 6096

•Oscilloscope sell or swap for military radio, any age,.•GOULD OS4200 Digital Storage CRO 500kHz, •TEKTRONIX 5110 with NIC527 signal averager, •TEKTRONIX 7704A dual trace 10khz on screen display, •TEKTRONIX 545B dual trace, •TEKTRONIX 564 dual trace. Wyong delivery. Ray Robinson VK2ILV Sydney (02) 9489 8561 robinson@srsuna.shlrc.mq.edu.au

•Yaesu FT-101Z HF TXCVR S/N 9C020308. G.C. Spare PA valves. Built in fan. DC-DC converter $250.00 •Two Yaesu FRG-7700 HF Receivers S/N 1H100251 & 1H100238. Both with FRT-7700 tuning units. Operators manuals. Fair condition. $100 00 each. •One 10/11m 3 element beam antenna with heavy duty coax cable. 20m of spare cable. $20.00 •One Yaesu gutter mobile antenna mount. 2m stub and 80m antenna. $20.00 •One mobile magnetic antenna base $10.00 •VK2KRQ John Le Fevre (02) 4369 0458 12A Rickard Road Empire Bay NSW

WANTED NSW

•Rotator for Wilson SY-3 beam. Three elements. Phone (02) 9916 1381 email alian@nlc.net.au

•Old valve receivers, military, commercial, dusty, unloved, junked or complete; Marconi, Admiralty, Hallicrafters, Hammerlund, AWA etc. Will put to good use. The heavier the better. Give me a hernia! Call John (02) 9533 6261

FOR SALE VIC

•Yaesu FT100 as new in carton $1250 •Bonus-Johnson (USA) LPF and Daiwa coax switch. New address, Croydon. Andy VK3UJ (03) 9723 8380

•Estate Ron VK3PRJ •Icom IC735 HF txcvr plus power supply s/n25827 $795. •Uniden Bearcat scanner UBC760XLT s/n 25000033 $200 •Kenwood TS180S HF txcvr s/n 0011847 SP180 ext spkr. No power supply $385. •Saiko SC7000 scanning receiver s/n 60627346 $150 •Yaesu monitor scope YO-100 s/n 5D206021 $95 •Heathkit scope SB620 $75. Bill VK3PH QTHR 03 5330 1466

•Deceased estate VK3JA Kenwood TS430S (two) with power supply. •Heathkit linear amp, Johnson Viking Match Box, various other items — headphones, multimeter, old ARRL handbooks etc. Inspection at Warrnambool. Some in fair conx only $800 the lot. Phone (03) 9728 5350 for details.

•Kenwood TS520S serial 810809; also •Hameg oscilloscope Model HM408-1. Offers invited. Doug VK3DE (03) 9804 2156

•Kenwood TS680S all mode multiband HF + 6m xcvr with mic and 30amp Emtron EPS30 power supply cross needle $1000 the lot. •Diamond MX2000 HF/VHF/UHF triple xer $50. Martin VK3JAZ (03) 9789 9196

WANTED VIC

•Kenwood SP120 •Kenwood AT130 Tuner •Kenwood VP0120; or accessories in good condition and working order to suit Kenwood TS130S John Lovell, PO Box 454, Richmond Vic 3121 Ph 0418 318 786

•Kenwood TS770 or TS780 2m/70cm duobander in GCAGWO Damien VK3RX (03) 5427 3121

FOR SALE QLD

•Racal transmitter (TA 104C) with receiver (RA 87D) and remote control (LA 105) All as new with handbooks $450. •Icom-254 2 metre all mod transceiver v.g.c. with handbook $240. •4CX250B valve with socket and chimney (all new EIMAC) $100. Gwen VK4CB QTHR (07) 3202 7137

•IC720A txcvr s/n 12431 0 - 30MHz Full coverage RX WARC bands incl. Good condition $500. Phone Lawrie VK4DAH (07) 3888 0501 or write QTHR

WANTED QLD

•23cm transverter, w/wo accs. VK4PJ QTHR (07) 3399 2881

FOR SALE SA

•Morse Tutor Datong model DTO G.C. $120. VK5CJM John (08) 8381 7905 QTHR

•Radio shack clearance, changing hobby. Everything must be sold. Send SASE to Paul, PO Box 76, Peterborough SA 5422 or phone (08) 8651 2398

WANTED SA

•Four element triband beam 40 foot guyed lattice tower with rotator and indicator or similar. VK5ASN (08) 8725 2526 QTHR

FOR SALE WA

•Hy Gain Beam Explorer 14, 10-15-20m, $ 200, •Comet 23cm Yagi Group, 4x52 Ele, with matching network, $ 600, •Maspro 70cm/2m Cross Yagi System for sat-comm. $ 150, •Comet aluminium roof tower, 12 ft, $ 200, •Hills crank up tower, 13m, $ 300, •28 MHz Monoband Yagi, 7 element, 2 reflectors, 9.80m boom, top gun, like new, $ 500, •Kenwood TS 50, $ 900, •Kenwood TS 440S, looks bad, but works ok, $ 500, •70cm Lin Amp, TLA 432-100, 100 Watt out, $ 500, •TWE Mobile-HF-Amplifier MA 500, 600 Watt, $ 600, •Metron Mobile-HF-Amplifier MA 1000, $ 800, •Diamond SX 1000 SWR Meter, 4 Bands, 1,8 - 1300 MHz, new, $200, •SCS PTC-II Pactor controller, $ 1,100, •MFJ 249 Antenna Analyzer, battery bracket defect, $100, •NIR 10, digital noise reduction unit, $ 200, •AOR AR 2002, Scan-Receiver, poor reception, $200, •Drake SP 75 speech processor, $ 200, Walter in Perth, VK6BCP, (08) 9341 2054, e-mail: vk6bcp@arrl.net

FOR SALE TAS

•4 Cisco IGS Router/Bridge, IOS 9.1, 1 Ethernet 1 Serial ports $100ea ono •1 Cisco AGS+ Router, IOS 9.1, 1 Ethernet, 5 Serial ports $350 ono. Justin VK7ZTW QTHR (03) 62231351 justin@hmjgc.fam.aust.com

MISCELLANEOUS

•Pactor. Seek modifications for Kenwood TS120-S to obtain fast AGC for Pactor or Amtor. Rob VK5RG QTHR Phone (08) 8379 1889

•If you got your licence before 1975 you are invited to join the Radio Amateurs Old Timers Club. A $2.50 joining fee plus $8.00 for one year or $15.00 for two years gets you two interesting Journals a year plus good fellowship. Arthur Evans VK3VQ or Milton Crompton VK3MN can supply applications forms. Both are QTHR in any Call Book.

•The WIA QSL Collection (now Federal) requires QSLs. All types welcome, especially rare DX pictorial cards, special issue. Please contact the Hon Curator, Ken Matchett VK3TL, 4 Sunrise Hill Road Montrose VIC 3765, tel. 03 9728 5350.

TRADE ADS

• AMIDON FERROMAGNETIC CORES:

For all RF applications. Send business size SASE for data/price to RJ & US Imports, PO Box 431, Kiama NSW 2533 (no enquiries at office please ... 14 Boanyo Ave Kiama).

www.cyberelectric.net.au/~rjandusimports

Agencies at: Assoc TV Service, Hobart: Truscotts Electronic World, Melbourne and Mildura: Alpha Tango Products, Perth: Haven Electronics, Nowra

• WEATHER FAX programs for IBM XT/ATs *** "RADFAXZ" $35.00, is a high resolution short-wave weather fax, Morse and RTTY receiving program. Suitable for CGA, EGA, VGA and Hercules cards (state which). Needs SSB HF radio and RADFAX decoder. *** "SATFAX" $45.00, is a NOAA, Meteor and GMS weather satellite picture receiving program. Needs EGA or VGA & WEATHER FAX PC card, + 137 MHz Receiver. *** "MAXISAT" $75.00 is similar to SATFAX but needs 2 MB of expanded memory (EMS 3.6 or 4.0) and 1024 x 768 SVGA card. All programs are on 5.25" or 3.5" disks (state which) plus documentation, add $3.00 postage. ONLY from M. Delahunty, 42 Villers St, New Farm QLD 4005. Ph 07 358 2785.

http://www.hamsearch.com
a not-for-profit site that is a search engine for hams

the balloon gang

We now have four QRP H.F. beacons for the y2k balloon.

These will transmit a continuous C.W. message, and ident. The beacons are on 3.58 MHz, 7.045 MHz, 28.075 MHz, and 50.22 MHz. All have 1/2 wave vertical dipoles. If conditions are favorable we expect reports world wide. We are waiting for a favorable (easterly) jet stream, and of course fair to good local wx. See http://www.caribooweb.com/y2kballoon for launch, logging, and balloon information. Please pass on to all that may be interested, Tnx de Ric, VE7 CUP, for the "Balloon gang"

Listen!

Have you heard this week's DIVISIONAL BROADCAST?

Turn the page for times and frequencies.

WIA Division Directory

The WIA consists of seven autonomous State Divisions. Each member of the WIA is a member of a Division, usually in their residential State or Territory, and each Division looks after amateur radio affairs within its area.

Division	Address	Officers		News Broadcasts Note: All times are local. All frequencies MHz.	Fees	
VK1 ACT Division GPO Box 600 Canberra ACT 2601	President Secretary Treasurer	Gilbert Hughes John Woolner Les Davey	VK1GH VK1ET VK1LD	VK1WI: 3.570 LSB, 146.950 FM each Sunday evening from 8.00pm local time. The broadcast text is available on packet, on Internet *aus.radio.amateur.misc* news group, and on the VK1 Home Page http://www.vk1.wia.ampr.org	(F) (G) (S) (X)	$72.00 $56.00 $44.00
VK2 NSW Division 109 Wigram St Parramatta NSW (Office hours Mon-Fri 1100-1400) (PO Box 1066, Parramatta 2124) Phone 02 9689 2417 Freecall 1800 817 644 Fax 02 9633 1525	President Secretary Treasurer Web: *http://marconi.mpce.mq.edu.au/wia* e-mail: *vk2wi@ozemail.com.au*	Michael Corbin Eric Fossey Eric Van De Weyer	VK2YC VK2EFY VK2KUR	From VK2WI 1.845, 3.595, 7.146*, 10.125, 14.160, 24.950, 28.320, 29.120, 52.120, 52.525, 144.150, 147.000, 438.525, 1281.750 (* morning only) with relays to some of 18.120, 21.170, 584.750 ATV sound. Many country regions relay on 2 m or 70 cm repeaters. Sunday at 1000 and 1930. Highlights included in VK2AWX Newcastle news, Monday 1930 on 3.593 plus 10 m, 2 m, 70 cm, 23 cm. The broadcast text is available on the Internet newsgroup *aus.radio.amateur.misc*, and on packet radio.	(F) (G) (S) (X)	$69.00 $56.00 $41.00
VK3 Victorian Division 40G Victory Boulevard Ashburton VIC 3147 (Office hours Tue & Thur 0830-1530) Phone 03 9885 9261 Fax 03 9885 9298	President CEO Secretary Web: *http://www.tbsa.com.au/~wiavic/* e-mail: *vk3wi@rint.com.au*	Jim Linton Barry Wilton Peter Mill	VK3PC VK3XV VK3APO	VK3BWI broadcasts on the 1st and 3rd Sunday of the month at 8.00pm. Primary frequencies, 3.615 LSB, 7.085 LSB, and FM(R)s VK3RML 146.700, VK3RMM 147.250, VK3RWG 147.225, and 70 cm FM(R)s VK3ROU 438.225, and VK3RMU 438.075. Major news under call VK3WI on Victorian packet BBS and WIA VIC Web Site.	(F) (G) (S) (X)	$75.00 $61.00 $47.00
VK4 Queensland Division GPO Box 638 Brisbane QLD 4001 Phone 07 3221 9377 Fax 07 3266 4926	President Secretary Treasurer e-mail: *office@wiaq.powerup.com.au* Web: *http://www.wia.org.au/vk4*	Colin Gladstone David Jones Bill McDermott	VK4ACG VK4OF VK4AZM	VK4WIA: 1.825 MHz SSB, 3.605 MHz SSB, 7.118 MHz SSB, 14.342 MHz SSB, 21.175 MHz, 28.400 MHz SSB, 29.220 MHz FM, 53.725 MHz FM, 147.000 MHz FM, 438.500 MHz (Brisbane only), and regional VHF/UHF repeaters at 0900 hrs EAST Sunday. Repeated on 3.605 MHz SSB & 147.000 MHz FM at 1930 hrs EAST Monday. Broadcast news in text form on packet under WIAQ@VKNET.	(F) (G) (S) (X)	$95.00 $72.00 $56.00
VK5 South Australian Division (GPO Box 1234 Adelaide SA 5001) Phone 08 8294 2992	President Secretary Treasurer	Jim McLachlan David Minchin John Butler	VK5NB VK5KK VK5NX	VK5WI: 1827 kHz AM, 3.550 MHz LSB, 7.095 AM, 14.175 USB, 28.470 USB, 53.100 FM, 147.000 FM Adelaide, 146.700 FM Mid North, 146.800 FM Mildura, 146.825 FM Barossa Valley, 146.900 FM South East, 146.925 FM Central North, 147.825 FM Gawler, 438.425 FM Barossa Valley, 438.475 FM Adelaide North, ATV Ch 35 579.250 Adelaide. (NT) 3.555 USB, 7.065 USB, 10.125 USB, 146.700 FM, 0900 hrs Sunday. 3.585 MHz and 146.675 MHz FM Adelaide, 1930 hrs Monday.	(F) (G) (S) (X)	$77.00 $63.00 $49.00
VK6 West Australian Division PO Box 10 West Perth WA 6872 Phone 08 9351 8673	Acting Pres. Secretary Treasurer Web: *http://www.omen.net.au.~vk6wia/* e-mail: *vk6wia@omen.net.au*	Cliff Bastin Christine Bastin Bruce Hedland-Thomas	VK6LZ VK6ZLZ VK6OO	VK6WIA: 146.700 FM(R) Perth at 0930hrs Sunday relayed on 1.825, 3.560, 7.075, 14.116, 14.175, 21.185, 29.680 FM, 50.150 and 438.525 MHz, country relays 3.582, 147.200 (R) Cataby, 147.350 (R) Busselton and 146.900 (R) Mt William (Bunbury). Broadcast repeated on 146.700 at 1900 hrs Sunday relayed on 1.865, 3.563 and 438.525 MHz : country relays on 146.350 and 146.900 MHz.	(F) (G) (S) (X)	$69.00 $59.00 $38.00
VK7 Tasmanian Division PO Box 271 Riverside TAS 7250 Phone 03 6425 2923 Fax 03 6425 2923	President Secretary Treasurer Web: *http://www.wia.tasnet.net*	Ron Churcher Tony Bedelph John Bates	VK7RN VK7AX VK7RT	VK7WI: 146.700 MHz FM (VK7RHT) at 0930 hrs Sunday relayed on 147.000 (VK7RAA), 146.725 (VK7RNE), 146.625 (VK7RMD), 3.570, 7.090, 14.130, 52.100, 144.150 (Hobart), repeated Tues 3.590 at 1930 hrs.	(F) (G) (S) (X)	$88.00 $75.00 $55.00
VK8 Northern Territory (part of the VK5 Division and relays broadcasts from VK5 as shown, received on 14 or 28 MHz).				**Membership Grades** **Full (F) Pension (G) Needy (G) Student (S) Non receipt of AR (X)** **Three-year membership available to (F) (G) (X) grades at fee x 3 times.**		

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It is impossible for us to ensure that the advertisements submitted for publication comply with the Trade Practices Act 1974. Therefore, advertisers and advertising agents will appreciate the absolute need for themselves to ensure that the provisions of the Act are strictly complied with.

VICTORIAN CONSUMER AFFAIRS ACT

All advertisers are advised that advertisements containing only a PO Box number as the address cannot be accepted without the addition of the business address of the box-holder or seller of the goods.

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The following items are normally available for sale in the N.S.W. Division Bookshop. No price shown indicates out of stock - stock received regularly from USA and UK, so please call for availability. We can arrange special orders for items not normally held in stock - just give us a call.

Order by telephone quoting credit card details, or by mail enclosing cheque, money order or credit cards details to -

W.I.A. (N.S.W.Division), P.O. Box 1066, Parramatta. NSW 2124
Tel: (02) 9689 2417 or Fax (02) 9633 1525

Discounts are available on most items to W.I.A. Members - please check before ordering. Post/packing extra where applicable

	Retail Price
Antennas:	
Antennas & Techniques for Low Band DXing - J. Devoldere ON4UN	37.00
ARRL Antenna Book	50.00
Antenna Compendium volume 1	20.00
Antenna Compendium volume 2	25.00
Antenna Compendium volume 3	25.00
Antenna Compendium volume 4 (including software)	
Antenna Compendium volume 5 (including software)	
W1FB's Antenna Notebook - Doug DeMaw W1FB	21.00
Practical Wire Antennas - J D Heys G3BDQ	33.00
Physical Design Yagi antennas - David B Leeson W6QHS	32.00
Practical Antenna Handbook 2nd Edition Carr	98.00
Antenna Impedance Matching - Wilfred N Caron	31.00
RSGB HF Antenna Collection - Edited by Erwin David G4LCI	41.00
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W6SAI's HF Antenna Handbook - Bill Orr W6SAI	32.00
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VX-1R shown full size

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